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FOOD INDUSTRIES

• FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

ms of asparagus being
o-coated for Army

DECEMBER 1945

Are You Personnel Minded?

Now Comes Quick Dehydration

How To Use DDT For Lasting Effect

Retarding Rancidity In Salt-Cured Fish

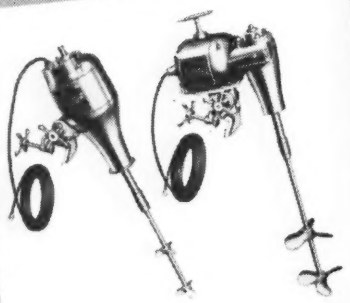
So You Are Going Into Frozen Foods?

Weight Control That Pays in Packaging

Amioca—The Starch From Waxy Corn

McGRAW-HILL PUBLICATION

IN MODERN *Foods* PROCESSING—

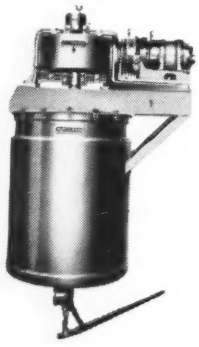


Patterson Typhoon Portable Power Mixers

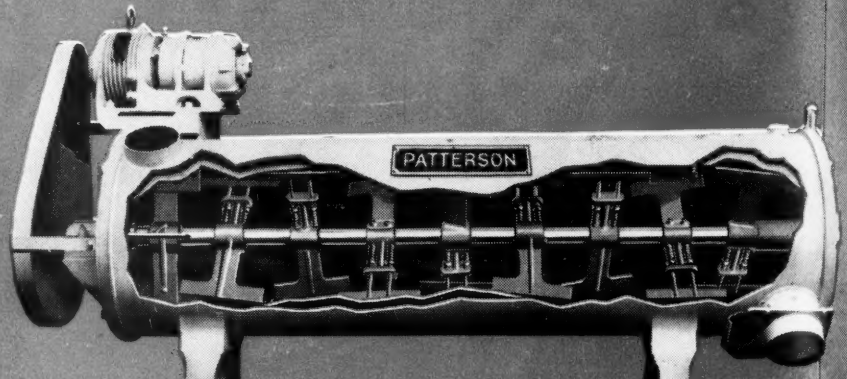
Patterson

SATISFACTORY MACHINERY

ASSURES PRODUCT UNIFORMITY and LOWER PRODUCTION COSTS

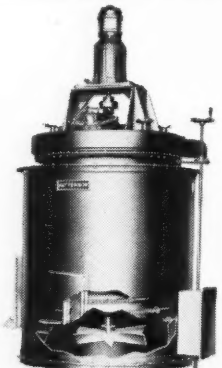


Patterson Jacketed Soap and Grease Kettles



Patterson Food Mixer and Pre-Heater

Patterson Steam Heated Kettles



Patterson Electric Process Kettle

The precision performance you must have for perfect food processing...the engineered design that assures greatest convenience in handling, cleaning and in maintenance...plus the durability that protects your investment. Consult us on your needs!

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President

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Cans of food supplied to the Army overseas have been coated with a dull finish to check rusting and prevent reflection of light. This operation, as carried out on asparagus at the Bercut-Richards packing plant, is shown on the cover. The cans are emerging from the drying tunnel. (USDA Photo by Osborne)

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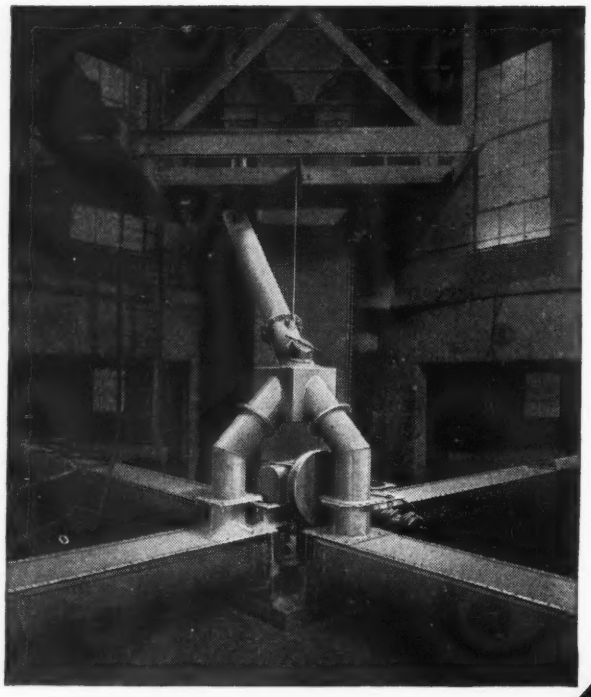
Consult Link-Belt before you buy a *Screw Conveyor*



Link-Belt bucket elevator delivering sugar to four 14-inch double-flight Helicoid conveyors which convey it to top of storage silos.

Important Facts About L-B Screw Conveyor

1. ***Compact:*** require little space and head room.

2. ***Simple Construction:*** no elaborate chutes or skirting.

3. ***Dust-tight:*** dust seals, tight covers and joints, L-B spring cover clamps keep dirt out, keep dust inside.

4. ***Easy Installation:*** economical, simple; ease of passing through wall, with small opening.

5. ***Durable:*** made as durable as necessary for materials handled; wear is very gradual. Light or heavy metals, stainless steel, etc., are used as required.

6. ***Economical:*** first cost, installation and maintenance are all low.

● When you are considering new screw conveyor equipment—regardless of size, type or quantity—or modernizing your present screw conveyor system, it is logical and wise to go to Link-Belt . . . "screw conveyor headquarters."

Link-Belt makes a wide variety of screw conveyors, designed to meet particular requirements. There are various lengths and diameters of screws, made of various metals, in various designs. These designs have been proved by experience, in actual service.

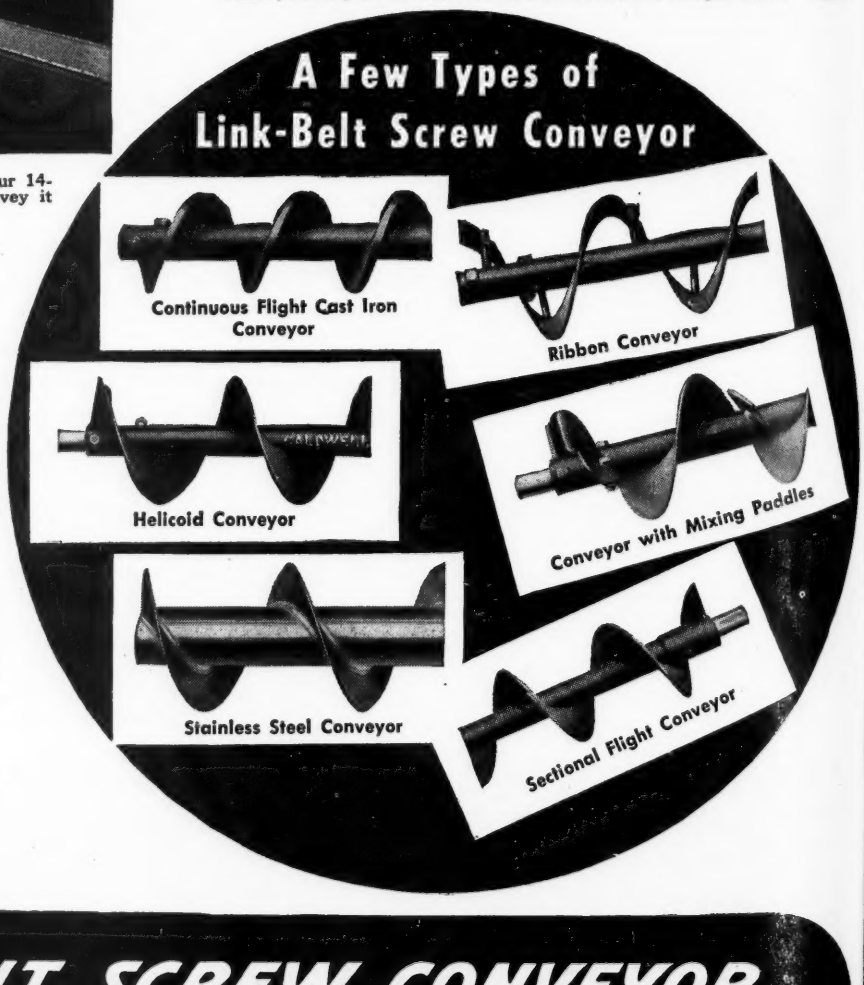
Link-Belt also offers you vast engineering experience and skill, outstanding manufacturing ability and facilities, engineering service, and quick delivery from distributors and warehouse stocks.

Call in a Link-Belt Materials Handling Engineer; let him consult with you and make recommendations suitable to your specific needs. His experience is adequate, and his advice is unbiased, as Link-Belt makes conveyors of practically every type.

LINK-BELT COMPANY

Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.

Offices, Factory Branch Stores and Distributors in Principal Cities. 10,059



LINK-BELT SCREW CONVEYOR

COLLARS · COUPLINGS · HANGERS · TROUGHS · BOX ENDS · FLANGES · THRUSTS · DRIVES

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This Patent Recommended For Executive Study

AS A RULE, patents are not very entertaining reading, but here is one very gratifying exception. Buy yourself a copy of U. S. Patent 2,369,847, "Preparation of Flavoring Materials," by Aksel G. Olsen and Edward Seltzer, assignors to General Foods Corp.

It is a superb job, dealing with the loss of flavor from gelatine and pectin desserts, and how to prevent it by homogenizing the flavoring material (usually an essential oil) in the dessert base. In patent lingo, this is an edible hydrophile colloid. After homogenization, the colloid is dehydrated in such a manner that the volatile flavoring material is imprisoned and cannot escape. Stated in the simplest language, the procedure is one of controlled case-hardening. The researchers have worked out what seems to be every conceivable variation in dehydration and subsequent processing steps. They even have determined the amount of losses by volatilization when the dried flavored gelatine is ground to the requisite fineness, and also have measured the small flavor losses under differing conditions all along the process.

We recommend study of this patent by top executives of companies that never have known what a real research department can do, especially those sales-minded executives who are quite sure that there are only selling problems to meet in the peacetime business world. Little imagination is required to discover the implications of this patent for distribution plans, time permissible in the channels of trade, shelf life, claims for unsatisfactory goods, loss of consumer good will through loss of flavors, and probable end of further research expense in an effort to prevent flavor loss by special packaging. Here is an excellent example of solving a selling problem by scientific research.

Many a sales-minded executive has said that General Foods people are smart merchandisers—about as smart as they come. But this is only part of the story. They are great manufacturers, knowing research and production as well as selling technics. This patent reveals to anyone who will study it, and do a little meditating about its meaning, the sort of competition that will come in the future. The difficult competition will come not from companies so much as from ideas; not so much from tough competitors and price cutters as from skillfully conducted research—research guided by top executives toward solving the real problems that face a company.

WHAT was the real problem here? Was it merely flavor loss? Was it a need for a better package? Was it a need for a rapid distribution setup that would get the product to the consumer while there was still some residual flavor left in the dessert? Was speed the right answer? Or, was it a production problem?

SUCCESSFUL research pays big dividends. But it takes more than a good research department to win the maximum rewards. It also takes teamwork between top executives and the research department. One can assume that a top executive knows how to press his advantage, or he wouldn't be on the job. But too often the top men do not realize that a missing advantage can be created in the research department—provided that the research department can be told what is needed. Good research gives the same advantage as filling an inside straight in a poker hand. The executives name the needed card. Researchers produce it.

GET the patent and study it. Not for what it can tell you about gelatine dessert flavor retention, but for what it can suggest to top management in the way of reduced costs of distribution.

NOTE: Copies of U. S. Patents can be obtained from the Commissioner of Patents, Raleigh, N. C., by sending 10 cents in cash (stamps not accepted). Give the number and title of the patent and where you want it sent.

L. V. Burton EDITOR.

The Talk of the Industry

• NOW you see it, and now you don't. The reported stockpile of sugar in Java grows and diminishes. First it was 1,600,000 tons, grew a couple of millions on tales from Holland, then subsided again. It's pretty difficult to calculate accurately on what *may* be on the other side of the earth from where one sits.

• A CYNICAL labor economist who was once a college professor gloats over this yarn: "Labor expects that there will be 7,000,000 unemployed until the next depression."

• THE same labor economist is of the opinion that within the next ten years this nation must increase the annual wage of a worker who supports himself and a family of three to an average figure of $5,000 or "else we shall have a crisis." A crisis in his language, reminiscent of New Deal semantics, is only another word for a depression.

• BUT not all his views are along the same line. He also says that the future of the nation's economy does not depend upon jobs in production; that Labor is not worried about the loss of jobs brought about by increases in technological efficiency, provided that industry gives labor a fair share of the savings. What worries him is whether the displaced persons will be able to get jobs in distribution and service industries.

• "LAVISH earnings would be bad public relations" in 1946, advises an investment counsellor who predicts that corporations would cut prices rather than be embarrassed by too much money. His view seems to be that organized labor intends to get its share before the price cuts to relieve embarrassment can go into effect.

• A NEW problem of public relations and sales technic has been created by Borden's route salesmen. Each consumer received a communication signed "Your Milkman." It claims that continuation of every-other-day deliveries means that the consumer "will not receive the full peacetime service for which you are paying."

Does this means that the milkman believes the price of milk will be held down if daily deliveries are resumed?

• WHEN cheese came off the ration list, one of the larger biscuit manufacturers telephoned an order for 40 carloads of sharp-cured cheese, only to be told that there was no cured cheese in the country. Who says the war is over?

• NOW that reports of Japanese atrocities are being released, it is possible to reveal a 1944 conversation with Sir William Webb, Chief Justice of the Supreme Court of Queensland, and Chairman of the Australian Commission to Investigate Japanese Atrocities. After a personal inspection of every possible case, he stated that the crimes the Japs committed were so revolting that he hated to discuss them even among men, that castration of prisoners was one of the less offensive of their crimes.

Being a judge, his appraisal of Japanese acts is most judicial. As nearly as can be recalled, he said: "Apparently it is not Japanese policy to permit what we regard as atrocities; neither is it their policy to prohibit atrocities. Therefore the captive undergoes whatever treatment the commanding Japanese officer thinks is proper. This accounts for the conflicting statements from escaped prisoners. Some of our chaps will stoutly maintain that the Japanese are chivalrous enemies. This is the truth—as far as they know it; but it is not the whole truth. For every man who has had this sort of experience, there are many more who know the Japanese as cruel, unchivalrous barbarians."

Americans are now being told of the same sort of fiendish tortue of our soldiers. From what we know, it is apparent that the Japanese are not even half-civilized. The Chinese theory that the Japs are recently descended from monkeys is a slander on the Simian tribe. Let no one be fooled or softened by their present meekness, bowings and apologies.

Hors d'Oeuvres

• *Researchers find that advertising is of more interest than any of the editorial departments for 96 percent of the women readers of newspapers. How can they talk so much yet read so little?*

• NOW that reports of Japanese has engaged Business Research Corp. to research into dishwashing methods and equipment. But if they succeed in mechanizing dishwashing in all of the restaurants, how is one to pay his dinner check?

• *Less work for mother and thousands of new jobs in the food industry in the years ahead are seen by Seabrook as coming out of cooked quick-frozen meals on throwaway plates. Verily, it looks at long last as if the food processing industry were on the verge of production for use rather than processing for preservation.*

• An Australian apiculturist has taken the sting out of bees through the mating of quiet types by artificial insemination. Now, will some genius teach bees to do permanents so they can leave out the comb?

• *Borden's "Elsie" has a southern rival in Irvindale Dairies "Minnie Quarts," who, we read in the "Moos," has a new daughter "Lotta Pints."—Yep, dairy promotion is really the nuts.*

• Now that the war is over, some of our allies seem to think that "lend-lease" is spelled "lend-leash."

• *What with the sugar shortage, Hunt Foods could not pack this season's fruits in the heavy sirup to which its customers were accustomed. Light sirup was deemed an inadequate substitute, so virtually no Hunt-labeled fruits will be available from this season's pack. When it comes to quality, Hunt, like the chewing gum manufacturer, is strictly wrigley.*

• Salem County, New Jersey, peach growers claim atom bomb damage to their orchards. Say they, the hydrogen fluoride fumes from atomic energy development work killed the 1944 crop. Well, we really didn't expect that we had heard the last of the atomic bomb.

F.K.L.

Wide World

Do employers give the same attention to selection, training and maintenance of manpower as they give to the purchase, installation and upkeep of equipment? The production capacity of every machine and every operation depends upon the worker involved.

Are You Personnel Minded?

Is there a wide gap between your front office and the plant employee? Usually it is not apparent, but this test, the result of a former company president's years of experience, will reveal it

By ALICE RICE COOK
Consultant on Personnel Relations, New York, N. Y.

FOOD industrialists are facing keen competition in the expanding civilian market. Every cost item in production and distribution is now under close examination.

One of the large cost items is that of the payroll—an investment sometimes amounting to as much as 21 percent of the total manufacturing cost. Wise executives and managers are reevaluating their payroll investment in the light of returns. But before this can be done intelligently, it is necessary to consider one factor often overlooked in cost evaluation—the human factor.

The human factor has long been recognized in distribution and retail selling, where the slogan, "The customer is always right," has taken the place of "The public be d——." In industry, the human factor has assumed more and more importance during the war years. In certain progressive concerns, one hears it said that many of the problems still remaining in production and distribution are the results of poor human relations. Other concerns are discovering such facts as these: Payrolls are paid to people. Machines are made and run by people. Management is made up of people.

This evaluation of the payroll in terms of persons employed is basic to the trait of being personnel minded. To industry's concern in operations, equipment, job know-how, materials and methods, has been added a plus factor—the human factor. Being employee minded is no more sentimental than being machine minded; it is hard common sense. Well-served, well-operated machines produce up to capacity. Contented, adjusted employees behind machines or desks produce up to capacity.

Are we approaching the point of giving the same attention to selection, training and maintenance of manpower as we now give to the purchase, installation and upkeep of equipment? As more and more employers become aware of the human factor in every phase of industry, and emphasize it in organization, personnel and finance, we shall see the team of labor and machinery pulling evenly together under the guidance of capital and management. Sound employee relations must precede, and will determine sound industrial relations.

In the accompanying checklist of 25 questions, first read only the questions (omitting the explanatory paragraphs) and encircle for each question either *Y* (yes); ? (uncertain); or *N* (no). After scoring the list, go back through the inventory and read the explanatory paragraphs. In the questions you have answered affirmatively, you will probably think of much better explanations and ones which apply more to your own concern than the ones in the inventory.

Several years of experience in industry, including 12 years as president of E. L. Cook Brick Co., leads this author to conclude that the most serious problems of industrial relations arise because of the lack of adequate contact—between management and supervisory employees.—The Editors.

You may wish to discuss the questions with men from your supervisory and personnel staffs. After each man has rated himself, there is a basis for a worthwhile appraisal of your leaders and policies in the light of the answers to the questions. After such a discussion, it is suggested that a small employee-relations committee be chosen to prepare recommendations, to be submitted to management, of ways in which the human relations in your firm may be improved.

For the interpretation of your score ratings, turn to the end of the checklist.

HUMAN RELATIONS INVENTORY

Y | ? | N **Do you as a rule treat employees and coworkers as people rather than as workers?**

Employees appreciate being treated like human beings and respond to such treatment with loyalty and conscientiousness. It is good business to let employees know they are important as people to the company as well as being good workers.

Y | ? | N **Do you believe in, encourage, and implement continuous two-way communication between employees and management?**

One way communication, usually from the top to the bottom variety, results in a feeling of futility and resentment on the part of the employee and ignorance of employee attitudes on the part of management. The result is usually an explosion or, at best, an armed truce until such time as the situation becomes unbearable.

Y | ? | N **Do you recognize the fact that you are a human, like your employees, and subject to similar prejudices, hopes and fears?**

This attitude helps you to see the employee's point of view and to treat him in a democratic way. Before prejudices can be lessened in human relations, management must start with the improvement of its own attitudes.

Y | ? | N **Do you accord employee maintenance as important a place in your planning and procedures as you give to plant and equipment maintenance?**

Through efficient employee maintenance, the effectiveness of each employee as a person and on the job is kept at top notch, just as equipment is kept at peak production level through sound plant maintenance. If all types of maintenance receive equal emphasis, returns on investment in manpower will be more certain.

Y | ? | N **Are regular provisions made by you for supervision, management and personnel to discuss common problems of employee relations?**

The only way that these problems can be thoroughly understood and adjusted is by free communication among the people responsible for sound employee relations. As operating men increasingly recognize the bearing of good employee relations on production, it is good business for them to use the specialized help of management and the personnel department in insuring top notch human relations throughout the plant.

Y | ? | N **Are provisions made so that any one in your concern—from the top executives right straight down the line—can improve his human relations technics either through individual counseling or in other practical ways?**

You cannot expect either executives or employees to become proficient in any skill without training and practice. The development of practical skills in handling men, skills in working together, and skills in reaching agreements with other human beings is essential if we are to have profitable capital-labor-management relations. Foremen especially need such opportunities for training and practice.

Y | ? | N **Before an employee is promoted to a foreman or supervisory job, is he given special training and practice to perfect him in the employee-relations skills he needs in his new job.**

Before promotion, the prospective supervisor has proved his worth as an operating man. Now his job becomes that of leading *men* rather than doing the work himself. Too many otherwise promising foremen have failed because no one was available to appraise and develop their potential leadership abilities.

Y | ? | N **Are the men in your expanding selling force being given a chance for self-evaluation of their strength and weaknesses and opportunity for practical training in improving their selling technics?**

The postwar business world is the oyster of the salesman. The salesmanship of 1946, however, must be based on real knowledge of human relations and the consumer point of view, rather than on back slapping and an infinite capacity for liquid refreshment.

Y | ? | N **Have you a major interest in developing both fellowship and leadership ability on the part of the employees with whom you come in contact?**

The personnel point of view focuses on the full utilization and development of each employee's abilities and potentialities. Too long it has been the tendency on the part of management to relegate the qualities of good fellowship and leadership to the psychic realm, leaving their development to chance. As with any skill, that of human relations can be taught. It must be practiced and repracticed, successfully, before cooperative and wise behavior becomes a habit.

Y | ? | N **Is your employment department building good consumer relations by its treatment of applicants, employees and sign-outs?**

Now that the selection and placement of employees can again be based on sound technics of testing and interviewing, each employment worker must be measured by his ability to deal with human beings. The day of the "hire and fire" placement worker is over, giving way to the well-trained, emotionally stable individual who justifies his payroll investment.

Y | ? | N **Do you make certain that each new employee is treated as an important person during his process of induction?**

Courteous signing-in, full explanation of policies and regulations, guided tours, full introductions to supervisors and coworkers, with close follow up during the first weeks. Such induction methods as the foregoing, under the direction of an employee-relations worker, convince the employee of the interest felt for him by the company.

Y | ? | N **Is it standard practice to reevaluate at regular intervals the policies and procedures of your employee services and benefits?**

Changing community and employee needs often call for changed procedures in food service, insurance, hospitalization, pension plan, compensation, and so forth. The process of checking employee needs results in getting the employee's point of view—just as necessary in manufacturing as the customer's or consumer's point of view in distribution.

Y | ? | N **Is constructive use being made—by your supervisor and employee-relation workers—of the results of employee tests and examinations (aptitude and achievement tests; physical and psychiatric examinations) for the improvement of employee health and attitudes, and as a yard stick or incentive for transfers and promotions?**

Much valuable therapeutic material is lying idle in personnel and medical

files. Test results, used for preventive purposes, will often save valued employees from unnecessary breaks or eliminate sources of unproductive anxiety. Guidance based on results of tests often leads to improved employees through further training or additional education.

Y ? N **Are your supervisors using Merit Rating reports as a basis for helping employees remedy faults and capitalize on their strong points, as well as merely using the reports as justification for wage increases?**

The Merit Rating report is a good teaching vehicle, objective, continuing and company wide. A discussion of attitudes and behavior in the light of possible up-grading or promotion has great weight. But even more important is the fulfillment on the part of the employee of the universal desire to learn "where he stands," and what he can do to improve himself.

Y ? N **Do your employees really understand the wage evaluation program and its application to their own particular case?**

Employees have a right to know how their wages fit into the whole wage administration program and how their jobs fit into the job-description schedule. Any prospective changes should be explained in detail well before the changes occur, so as to eliminate any occasion for confusion and resentment (the enemies of good employee relations).

Y ? N **Are your employees always informed in advance of the reasons for and the procedures to be followed in any survey to be made by experts from either inside or outside the organization?**

In work simplification surveys, for instance, the cooperation of the worker can only be assured if he knows the whole story. Otherwise, the time-study man may find a bottle of ink mysteriously upset on his white shoes!

Y ? N **Have you recently re-evaluated the company policies relating to transfer, upgrading, promotion and release to determine their soundness and fairness?**

Where two or more employees gather together there is usually a discussion of the "boss." When the crabbing is fundamental, as in criticisms of unfair manpower utilization policies, look out for explosions.

Y ? N **Have you recently personally checked up on the true working conditions existing in your plant?**

Such factors as rest rooms, lockers, noise, ventilation, lighting, housekeeping, seating arrangement and bench layout can determine the effectiveness and satisfaction of employees. Two-way communication must be maintained, as conditions favorable to employee comfort and health at one season may not function satisfactorily under different weather conditions.

Y ? N **Do you insist that safety regulations, education and equipment be sold first to supervision in the light of the "human factor?"**

Without the understanding and cooperation by supervision and employees, safety becomes a game of wits, of beating the game and fooling the safety engineer. An autocratic "Don't" program is like any other nondemocratic project. Force and pressure generate resentment leading to the failure of the best-planned safety program.

Y ? N **Is your medical department awake to its responsibility for the preservation of the mental and physical health of each employee?**

No longer can industrial medicine be confined to industrial accidents. In human maintenance, preventive medicine plays a tremendous part. Physical and occupational therapy, physical-fitness programs and psychiatric counseling (in addition to the semi-annual employee checkup) form a basic insurance against the loss of employee time through illness, mental anxiety or lowered efficiency.

Y ? N **Is your attitude towards minority groups one of interest and appreciation of what they have to contribute?**

The handicapped veteran's future will depend upon the industrialist's success in implementing his sometimes vague idealism with practical selection, placement, training and counseling procedures keyed to the special needs of this group. Patience and emotional maturity on the part of supervision will carry the veteran over the hump of his return into civilian activity.

Y ? N **Have you familiarized yourself with veterans' rights, privileges and community resources in order to know how to counsel the individual veteran in your own concern or community?**

Successful business men have a great responsibility and privilege in becoming aids to the returning veterans. The settings of attitudes, vocational suggestions, practical leads and bringing the veteran up to date are among the jobs which an older friend can do better than all the organized veterans' centers. Personal interest and follow-through on the part of already established business men will mean adjusted and satisfactory workers.

Y ? N **Do you give women an equal chance with men to demonstrate their ability to do a given job?**

Women have much to contribute to industry and business, especially in employee-relations work. They should be held up to the same standards as men and allowed the same freedom of initiative. "The best person for the job" is one of the finest indications of the true personnel point of view.

Y ? N **Can you appreciate and meet without resentment the need of employees for personal and social satisfaction in their work?**

Noontime recreation, pleasant coworkers, interested supervisors, counseling for personal problems, after-work classes if the community does not provide them. Those and other provisions for acknowledging the dignity of the individual worker constitute a vital part of human maintenance. To discard them as "coddling" is to imperil the happiness and productivity of an expensive investment —the employee. Any recreational activities should be self-supporting if possible, to avoid the slightest tinge of paternalism.

Y ? N **Are you contributing your knowledge and wealth of experience to the community in which you live?**

The community-minded industrialist finds himself in the midst of a never-ending laboratory stored with experiences beyond price. An acquaintance with young people and a knowledge of adult education and recreational resources enable him to enrich his own interests, as well as to pass on such information to those wishing guidance. The industrialist learns that first he is a person, then a community dweller, and last a world citizen.

Rate yourself by this table:

Y equals 4 points
? equals 2 points
N equals 0 points

Add your score. If it is from 80 to 100 points, your organization is most fortunate.

If your score is between 60 and 79 points, you are well on your way towards being personnel-minded.

If your score is under 60 points, it is well for you to do a job of self-evaluation as to your attitude towards human relationships—not only at work but in every situation. If you are contributing nothing to your community, skimping your family relationships and putting high pressure, sarcasm, tactlessness and arbitrary decisions into your daily working contacts, the time hase come for a ruthless analysis of what you are doing to the people around you.

Using DDT in Food Factories For Long Insecticidal Effect

By JEROME FEINER, Department of Health, City of New York

Most effective insecticide available, DDT retains its potency for a long time. When properly used, it is not dangerous to people. What you can do with this powerful bug killer, and how, are explained in this article

RELEASE of DDT (dichlorodiphenyl-trichloroethane) for civilian use has raised many questions as to what can be done with it in food manufacturing plants. Food manufacturers have asked: Is it dangerous? Can it be used in food processing plants? What precautions must be taken? Is it effective? How should it be applied? These questions will be answered and directions given for employing DDT as an effective, lasting insect exterminator.

This information presented here, however, is based only on information gathered from experiences with DDT in war areas and on experimental studies made under the supervision of government agencies. Civilian experiences may make some modification necessary.

DDT has unique properties which make it the most effective insecticide available. It is effective in killing more species of insects than any other insecticide. It maintains almost the maximum rate of kill and retains its potency for a long time—so long, in fact, that the period of activity has not yet been determined. And it is effective in minute amounts.

Applying DDT in food plant. Where possible, equipment is moved away from walls to facilitate spraying. All food materials and utensils are either removed or covered with tarpaulins to prevent contamination. The spray is applied to walls with vertical strokes, special effort being made to get it into cracks and spaces behind plumbing fixtures and similar installations. Movable platforms are turned on edge and sprayed on underside.

Where It Came From

A German chemist synthesized DDT in 1874. He did not, however, note its insecticidal properties. He merely described the chemical structure and its synthesis. In 1939, Swiss chemists used it in an agricultural insecticide preparation, Gesarol, for controlling moths and plant lice. In November, 1942, a sample of Gesarol was received in this country. H. A. Jones, chemist in charge of the U. S. Department of Agriculture laboratory at Orlando, Fla., isolated the active ingredient in it. Dr. Herbert J. Haller, of the Beltsville, Md., laboratory of the same Department, worked out the structural formula, completing his report in January, 1943. Since that time, the U. S. Department of Agriculture, the U. S. Public Health Service, the U. S. Food and Drug Administration and several universities have engaged in intensive research for the purpose of determining DDT's insecticidal properties and the best methods of using it against insects.

The War Production Board, the Army and the Navy cooperated in expediting the construction of facilities for the large-scale manufacture of DDT so that quantities would be available for use in war areas against disease-bearing insects. The armed forces needed and used all that could be produced. Not until the end of war was sufficient available for civilian use. Its manufacturers are listed in Table I.

DDT is 2,2-bis(parachlorophe-

Local Restrictions

The U. S. Food and Drug Administration, in their mimeographed release dated Sept. 5th, 1945, has taken the view that "there would seem to be no great possibility of the contamination of food" through the use of DDT in food plants, provided that proper precautions are taken. It is advised that food plant operators check on local restrictions that may exist against the use of DDT in food establishments. For example, the Sanitary Code of New York City prohibits the use of any poisonous insecticide except colored sodium fluoride in food establishments. Similar restrictions probably are in force in other communities. Such restrictions, however, probably will be relaxed as soon as responsible local authorities have had time to study the problem and take appropriate action.

Protective clothes minimize contact of DDT spray liquids with the skin. They include a wide-brimmed hat, a shirt with long sleeves, and rubber gloves. More elaborate protection is required for professional exterminators who apply DDT sprays day after day. A respirator is used to prevent inhalation of the spray, and goggles guard against eye irritation.

nyl) 1,1,1-tricholorethane. In pure form it is a white, light powder that readily agglomerates into lumps. It is insoluble in water, but is soluble in commonly used organic solvents, as shown in Table II.

The pure DDT powder cannot be effectively distributed in the low concentrations required for insecticidal effect. It is necessary, therefore, to dilute the concentrated pure substance to apply it as an effective insecticide.

Insecticidal Action

DDT is a contact insecticide—that is, when insects rest on a treated surface they absorb a lethal dose through their extremities and bodies. Ingestion is not necessary, and minute doses suffice to kill most insects. DDT does not repel insects, but acts on the nervous system, resulting in tremors and paralysis. While some insects may survive for 12 hours, most die a short time after exposure to a lethal dose.

Toxic Effects on Humans

When used as an insecticide and with simple precautions, DDT is not dangerous to humans. Many persons have been employed in spraying it, working eight hours a day, day after day and month after month without suffering demonstrable toxic effects. Diluted powder (10 percent DDT in talc or prophyllite, ground fine) has been applied to the skin and clothing of many thousands of people without ill effects. It is definitely less toxic than sodium fluoride or Paris green in insecticidal doses.

Oily solutions of DDT, however, are absorbed through the skin, and experiments have shown that it causes nerve and liver damage in animals. Adequate precautions should be taken, therefore, to minimize the opportunity for oil solutions of DDT to come into contact with the skin. Occasional contact apparently is not dangerous, but repeated or prolonged contact must be avoided. Since the effect of inhaling DDT sprays has not yet been determined, it is wise to minimize the inhalation of such sprays, especially in the case of persons employed as exterminators.

Precautions in Spraying

Avoid using solvents that are highly toxic to humans. Cyclohexanone and xylene have been found to be safe for DDT sprays, provided that simple precautions are taken.

Keep the spray off the skin to as great an extent as is possible under actual working conditions. Wear clothes that cover the neck, arms and legs. Wear a hat and goggles. Use a respirator or moist gauze mask to minimize inhalation. Oil-resistant gloves help to keep the spray off the hands. Use a clean, dry cloth to wipe off any of the solution that gets onto the skin. A pail of soapy water has been found convenient for washing the hands at intervals during the spraying operation.

Avoid spraying inflammable mixtures in the presence of a flame. If kerosene-base sprays are used, let them dry for at least 10 hours before introducing a flame into treated rooms. Eliminate vapors by ventilating the rooms during the period of drying.

Animal experiments have shown that DDT in foods can produce toxic effects. It is, therefore, neces-

TABLE I. Manufacturers of DDT.

J. T. Baker Chemical Co., Phillipsburg, N. J.
Cincinnati Chemical Works, Norwood, Ohio.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
General Chemical Co., 40 Rector St., New York, N. Y.
Hercules Powder Co., Wilmington, Del.
Hooker Electrochemical Co., Niagara Falls, N. Y.
Merck and Co., Rahway, N. J.
Monsanto Chemical Co., 1700 South Second St., St. Louis, Mo.
Montrose Chemical Co., 120 Lister Ave., Newark, N. J.
Sherwin-Williams Co., 101 Prospect Ave., Cleveland, Ohio.
Marietta-Harmon Chemicals, Inc., Marietta, Ohio.
Michigan Chemical Co., St. Louis, Mich.
Pennsylvania Salt Manufacturing Co., Widener Bldg., Philadelphia, Pa.
The Westvaco Chlorine Products, 405 Lexington Ave., New York, N. Y.
United States Rubber Co., Elm St., Naugatuck, Conn.

TABLE II. Solubility of DDT in Some Common Organic Solvents.

Solvent	Weight of DDT per gallon	Equivalent weight/volume concentration
Cyclohexanone	8 lb. 4½ oz. to 9 lb. 1 oz.	100 to 120%
Xylene	4 lb. 10½ oz.	56%
Ether	2 lb. 6½ oz.	29%
Kerosene (crude)	6½ oz. to 10½ oz.	5 to 8%
Kerosene (refined)	2½ oz. to 5½ oz.	2 to 4%
Ethyl alcohol	2 oz.	1.5%

TABLE III. Proportions for Dilution of 35 Percent Stock Solution.

Final concentration of emulsion	Parts DDT 35% stock solution	To parts water
5%	1	6
10%	2	5
20%	4	3

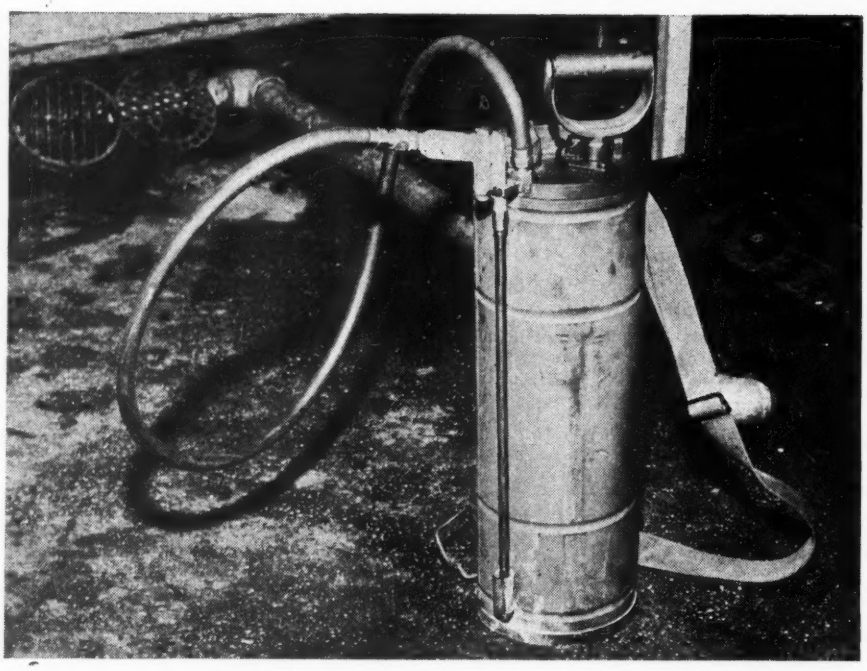
TABLE IV. Formulas for Solutions of DDT in Kerosene.

5 per cent solution	
DDT (100% concentrate)	2¼ lb.
Refined or deobase kerosene	4½ gal.
Xylene	½ gal.
10 per cent solution	
DDT (100 per cent concentrate)	4½ lb.
Refined or deobase kerosene	4 gal.
Xylene	1 gal.

Add the DDT to the xylene. Stir till most has dissolved. Then add the kerosene and stir.

TABLE V. Concentrations Required and Rate of Application for Various Surfaces.

Type of surface	Concentration of spray	Rate of Application, sq. ft. per qt.
Absorptive: Porous tile; unpainted plaster, plasterboard, or wood; concrete, cement, etc.	5%	250
Nonabsorptive: Painted (except fresh enamel); varnished, shellacked or waxed finishes, etc.	10%	500
Enameled or glazed: Lacquered and baked enamel finishes; vitreous enamel; glazed tile; glass brick; and similar surfaces	20%	1,000



Closeup of DDT sprayer. A modified agricultural insecticide sprayer, it is equipped with oil-resistant fittings, including the hose, valves and gaskets. It has a pressure gage, pressure relief valve and corrosion-resistant metal parts. The spray gun consists of a pistol grip with button release, a metal tube to which additional sections may be attached for longer reach, and a special nozzle that delivers a flat, fan-shaped, semi-coarse spray. At left may be seen two covers removed to permit spraying of floor drains.

sary to use the insecticide in food processing plants only under those conditions which preclude the contamination of foods. Before spraying, remove foods from the rooms or cover them so that the spray will not contaminate them. Cover all surfaces of equipment and machinery with which foods come into contact, such as table tops, benches, conveyors, hoppers, vats, tanks, kettles, bins, beaters and mixers. Utensils, too, must be protected from the spray.

Keep supplies of DDT separate from foods and conspicuously labeled; both the pure powder and the solution resemble many food ingredients. Minimize the chances for accidents by keeping DDT in a place where it won't be mistaken for a food ingredient.

Formulas, Concentrations

Experiences to date indicate that emulsions of DDT in water are better adapted for use in food plants than are other forms of application. Several satisfactory formulas are available.

One that has been used with success in large-scale experiments consists of:

DDT (100% concentrate powder)	35% by weight
Xylene	61% by weight
Triton X-100	4% by weight

First dissolve the DDT in the xylene, then stir in the Triton X-100. This stock solution is diluted for use with water and vigorously agitated to form an emulsion. The emulsion remains stable without agitation for at least 2½ hours, and it will be satisfactory for use in sprayers which lack agitators. The proportions for dilution are given in Table III.

Emulsifying Agents

Many emulsifying agents can be used. Duponal OS (at a concentration of 4 percent) and water-soluble Arctic Syntex A (at a concentration of 0.5 percent) have been reported to be satisfactory, yielding emulsions stable enough for use in sprayers which lack agitators. With a power sprayer equipped to agitate the emulsion, a 1 percent concentration of soap can be utilized as an emulsifying agent.

Solutions in Kerosene

Refined kerosene and deodorized kerosene, unless fortified by the addition of better solvents, will dissolve concentrations of only 2 to 4 percent of DDT. And Dr. L. L. Williams, Medical Director of the U. S. Public Health Service, has declared that solutions of DDT in concentrations of less than 5 percent were "entirely ineffective."

Kerosene solutions of adequate concentration probably will be used to some extent in food plants due to the availability of this material and its low cost. Crude kerosene is not well adapted for this use; it will stain painted surfaces. To increase the solubility of DDT in refined or deodorized kerosene, xylene or cyclohexanone—or some other suitable solvent—can be added to the mixture, as directed in the formulas of Table IV.

Rate of Application

To obtain the desired residual insecticidal action, it is necessary that a film of DDT adhere to the treated surfaces at a concentration of about 200 milligrams per square foot. Experiments have shown that good residual effects against vermin are obtained on practically all wall surfaces at this concentration. The higher the concentration of DDT in the spray, the smaller the quantity of spray required per unit of surface area. The rate of application should be about 4 c.c. of 5 percent spray per square foot; 2 c.c. of 10 percent spray per square foot; and 1 c.c. of 20 percent spray per square foot.

The degree of smoothless or absorptiveness of a wall surface determines the amount of spray that will be retained without runoff. Excessive quantities drain onto the floor. Therefore, while a 5 percent spray will leave an adequate residual on an absorptive surface, a 10 percent spray will give better results on a painted surface, and a concentration as high as 20 percent may be required for smooth nonabsorptive surfaces, such as fresh enamel and glazed tile. Table V summarizes the pertinent information.

Spraying Technics

The aim is to deposit a film of DDT crystals on the treated surface at the rate of 200 mg. per square foot. A semi-coarse spray is well adapted to this purpose, but a fine spray or mist diffuses into the air to such an extent that much of the spray is wasted. Control of the spray is facilitated by keeping the spray nozzle 4 to 8 in. from the surface being treated. Operators should be trained to apply the spray at the rates given in Table V. The tendency at the outset is to apply too much, so a few supervised trials should be made to check on the rate of application. Fly screens and similar objects can be treated more economically with a brush than with a sprayer.

Any good sprayer can be used, provided that it can be adjusted to deliver a semi-coarse spray, has oil-resistant fittings and will not spill onto the operator. Paint sprayers

and agricultural insecticide sprayers have given good results. Some manufacturers of home vacuum cleaners provide a spray attachment that is efficient. Hand sprayers (flit guns) and motor-driven atomizers give poor results, as the fine mist produced is not effective for wetting solid surfaces.

Proper maintenance of DDT sprayers requires that they be emptied, cleaned and oiled after use to prevent obstruction of the nozzles and corrosion of metal parts. Oil-resistant fittings, including the hose and valves and gaskets, are required (rubber fittings will deteriorate rapidly through contact with the solvents used).

This insecticide must be applied wherever insects rest or crawl, because they acquire lethal doses only through contact with it. Insects differ in their resting and crawling habits.

Flies, for example, prefer vertical surfaces such as walls, window screens and hanging fixtures. Roaches prefer dark locations, such as drains, undersides of tables, spaces behind and under fixtures and crevices. It is necessary to spray walls, ceilings and hanging fixtures, and to spray behind and under installations and drains. Cracks and crevices, too, should be treated, as well as screens and vertical pipe lines.

The spray dries fairly rapidly after application, leaving a film of DDT crystals adhering to the surface. This film is effective for periods ranging up to several months, provided that a sufficient amount of DDT has been applied properly. Even the German cockroach (*Blatella germanico*)—most resistant to the common vermin—will succumb to repeated treatments. Successful insect eradication by DDT is the result of applying adequate doses in a proper manner to the surfaces of the building frequented by vermin, coupled with an adequate program of plant sanitation.

Other Forms of DDT

Mention should be made of some of the other available forms of DDT, such as aerosols, powder and paint.

Aerosols are applied in the form of fogs or mists. They usually consist of solutions of DDT plus thanite, lethane, pyrethrum or rotenone. When properly applied, they are effective against adult flies and mosquitoes. They fail, however, to kill insects harboring in cracks, crevices and other areas to which the mist does not penetrate. They have little, if any, residual effect and therefore do not protect against reinfestation. It should be noted also that the eggs of many insects are immune to the effects of DDT insecticide.

Sherwin-Williams Co. has developed a resin-emulsion wall paint mixed with DDT, and other paint companies probably will introduce similar products. In tests conducted by the above company, flies and mosquitoes were eliminated from rooms painted with their material. Sufficient information is not yet available to evaluate the effectiveness of this new product.

DDT insecticide powder (10 percent DDT in an inert base, finely ground) has been used by the armed forces on a large scale for delousing purposes. The powder will find only limited use in food plants, inasmuch as the spray seems at this time to be more effective, more economical and safer.

Need for Sanitation

DDT is not a substitute for plant sanitation. If a food plant is to be sanitary and free from insects, it is necessary to keep the building and equipment clean, to store food so as to inhibit insect life, to exclude insects and insect-infested foods, and to eliminate all insect breeding and harboring places within the plant, the installation and the equipment.

Chocolate Milk—Product With Future

By GIDEON HADARY, Washington, D. C.

CONSUMPTION of chocolate milk has increased steadily in the United States since the early 1920's, when the first commercial dairy chocolate flavoring plants were established. Eleven major manufacturers of such flavoring were reported in 1943, and the table below is an unofficial compilation of their output over the 18-year period, 1925 to 1942.

With the cooperation of the 11 manufacturers, it has been possible to estimate the total amount of chocolate flavoring, both powder and sirup, sold annually to the fluid milk industry. From recommended dilutions, it is a simple matter to estimate the amount of chocolate milk processed. The increase in consumption seems to be concurrent with the increase in powder sales, which first assumed important proportions in 1937, and took a long jump in 1941. The sugar and cocoa shortage brought the first percentage decline in 1942.

Because the trend-line deviations of the actual data do not exceed three standard deviations in any single year, the trend represents a good statistical fit. Projection of this trend forecasts chocolate milk sales amounting to some 200,000,000 gal. in the eighth postwar year, or about double the 1942 sales.

Chocolate Milk Consumption as Percent of Milk and Cream Consumption in Cities and Villages and Average Per Capita Consumption, United States, 1925-1942.

Year	Milk flavored with chocolate sirup Gallons	Milk flavored with chocolate powder Gallons	Total chocolate flavored milk[1] Gallons	Fluid milk and cream consumed in cities and villages[2] Gallons	Percent chocolate milk of total fluid milk consumption	Average per capita chocolate milk consumption Gallons
1925.....	1,677,000	.....	1,677,000	.....[3]	....	0.01
1930.....	3,598,000	.....	3,598,000	3,729,000,000	0.10	.03
1935.....	22,080,588	371,300	22,451,888	3,554,000,000	.63	.18
1936	31,271,361	441,500	31,712,861	3,703,000,000	.86	.25
1937	38,915,943	11,947,870	50,863,813	3,756,000,000	1.35	.39
1938	36,730,872	16,225,733	52,956,605	3,768,000,000	1.41	.41
1939.....	41,554,381	18,327,170	59,881,551	3,843,000,000	1.56	.46
1940.....	45,728,512	22,502,018	68,230,530	3,847,000,000	1.77	.52
1941.....	55,632,333	35,060,648	90,692,981	4,054,000,000	2.24	.68
1942.....	60,352,419	35,902,126	96,254,545	4,378,000,000	2.20	.72

1. This estimate does not include chocolate milk which was not processed in dairies. (The chocolate flavoring sold to dairies is packaged in large containers, making it possible to segregate the volume used commercially from that used by households).

2. U.S.D.A., B.A.E. **Farm Production, Disposition, and Income from Milk,** April 15, 1943. Since these data include cream, chocolate milk actually constituted a somewhat greater percent of total fluid milk consumption than indicated.

3. Data not available in comparable form.

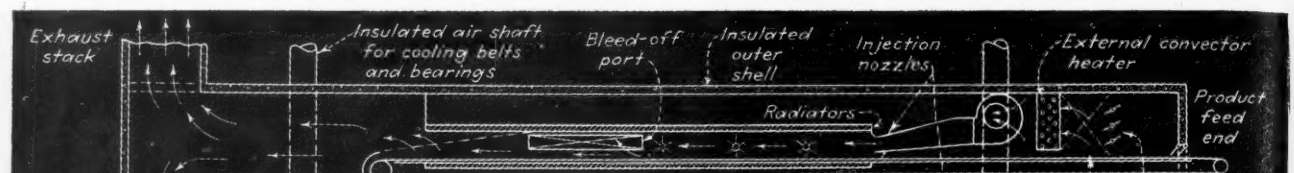


FIG. 1. Diagram of Birdseye dehydrater, showing downward flow of material being dried and upward flow of air in relation to conveyor belts, fans and heaters.

NOW—QUICK DEHYDRATION

Moisture content is reduced to less than 5 percent in 80 minutes. Controlled heat is applied by radiation, conduction and convection. Products agitated mechanically and by air-blast during continuous passage through six drying zones

By E. S. STATELER, Associate Editor, Chicago, Ill.

FROM quick freezing to quick dehydration as a means of food preservation for domestic retail marketing is a spectacular contrast when one thinks in terms of the temperature used and the physical properties of the resulting finished products. However, the technological objectives are the same, and in many respects the technics employed are closely similar.

Quick dehydration, as exemplified by the Birdseye method and embodied in the unit built by Cleaver-Brooks Co., of Milwaukee, Wis., for American Home Foods, New York, uses controlled heat applied by radiation, conduction and convection, together with mechanical and air agitation of the material.

The unit (Fig. 1) is so designed that it includes all stages of moisture removal—from the high-temperature stage with a rapid rate of evaporation to the low-temperature, or finishing-bin, stage with a very slow rate of evaporation. It has overall measurements of 42 ft. in length, 9 ft. in width, and 9 ft. in height and requires an installation floor space of 380 sq. ft., plus an additional 600 sq. ft. for aisle or working area. It is equipped with six endless conveyors made of stainless steel wire cloth. The first, or top, belt may have a smooth silicone derivative surface. Each belt is 46 in. wide and is individually chain-driven by a 1-hp. induction motor through a variable-speed unit. The top or first drying-zone belt is 35 ft. in length between pulley centers, with 29 ft. of its length in the drying zone. The other 6 ft. of its length receives the incoming wet material. Belts 2, 3, 4 and 5, functioning as separate drying zones or tunnels, are tiered above each other and below belt 1 so that the material being dried falls from an upper to a lower belt. Each of these belts is 29 ft. long between pulley centers. Belt 6 constitutes the finishing zone and is immediately below belt 5.

High Temperatures Used

Over each of the first five belts is a battery of overhead heaters operating with Dowtherm at 650 deg. F. Heat radiated from these units is directed upon the material to be dried as it moves along on the conveyors. A function of this heat is to raise the internal temperature of each particle being dried to a higher degree than is possible with convected, conducted or the combination of convected and conducted heat—also to a higher temperature than these other methods of heating will raise the external temperature of each particle. The result is that the radiated heat builds up an internal vapor pressure which is in excess of the vapor pressure on the exterior of the particle and speeds up the movement of moisture from the inside of the particle to its exterior. Lack of excessive surface drying or "case-hardening" is explained in terms of this increased movement of internal moisture.

Heat picked up from these units also aids in the progressive increase in the temperature of the air as it moves upward through the dehydrater.

Each of these first five belts also passes over, and in direct contact with, flat plates which are heated to 300 deg. F. by Dowtherm and are the source of conducted heat. The function of this conducted heat is to equalize from below the effective drying temperature on the top of the belt and avoid an unevenness in the drying of the larger particles on the belt. It also supplements the radiated heat in building up the internal temperature of the particles of the material being dried.

As the material being dried moves in a continuous manner through each drying zone and passes from one belt to another, its general direction is from the top to the bottom of the dehydrater in direct contact with heated air moving with an average velocity of 1,500 ft. per minute from the bottom to the top of the dehydrater. Although the gravity flow of the material being dried is counter to the convection flow of the heated air, both travel in the same direction through each of the six drying zones. In addition to the natural flow of heated air upwards, the velocity of the air is obtained and maintained at 1,500 ft. per minute by the coordinated action of eight fans, each of which delivers 6,000 cu. ft. of air per minute. Five of the fans are positioned in staggered relation to each other at alternate ends of belts 1, 2, 3, 4 and 5 so as to pick up the heated air from the delivery end of the belt immediately below and drive it through its particular drying zone parallel to the direction of movement of that particular belt.

Winnowing Effect

The air velocity of 1,500 ft. per minute is sufficient to give a winnowing effect upon the material being dried, but still not vigorous enough to do more than make an air separation of the smaller and drier particles from the larger and heavier ones. As the particles become lighter and lighter in weight through loss of moisture, they are carried progressively farther and with increasing rapidity through the drying zones because of the winnowing action of this air flow. Although the convected air becomes progressively hotter as it passes upward from one drying zone to another, the particles move progressively downward to drying zones of lower temperature as they become drier and lighter in weight. In that way the likelihood of scorching or darkening in color by caramelization of sugar or protein deterioration is lessened.

This winnowing action is sufficiently vigorous to tumble the particles about and keep them in intimate contact with the heated air as well as to carry the lighter particles through each drying zone at an accelerated rate. In fact, it is so vigorous that the very small and light particles of the material fed into the first zone are in the sixth or finishing zone within approximately 5 minutes, although the time of belt travel through the first five zones is approximately 50 minutes. Travel time of the heavy and slow drying particles is approximately 20 minutes for the first five zones. Their travel time is shortened and their rate of drying is speeded up by the agitating action of three rubber-tipped tedders

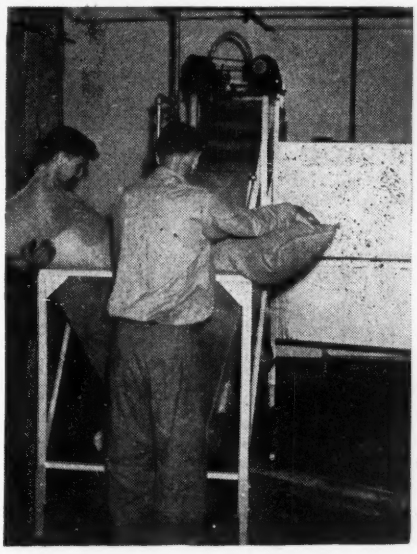


FIG. 2. First step in preparation of vegetables, such as carrots, for dehydration is the washing operation. They may be loaded into the water-filled hopper of the washer either by dumping directly from bags or field boxes or by means of power-driven conveyors.

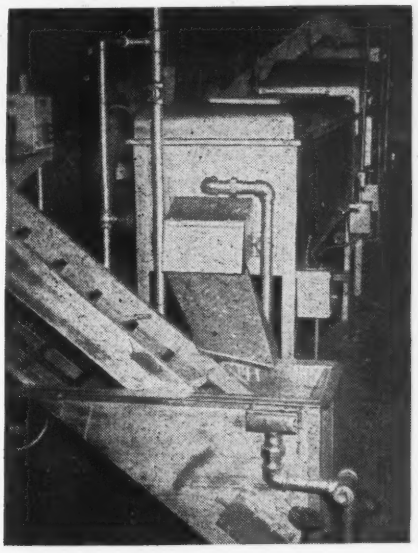


FIG. 3. From the hopper, the carrots are elevated through an 80-deg. F. water spray to the continuous peeler for a 70-second treatment in an 18 percent caustic solution at 218 deg. F. The peeler is close-connected with a rotary washer in which the carrots are subjected to a 150 p.s.i. water spray.

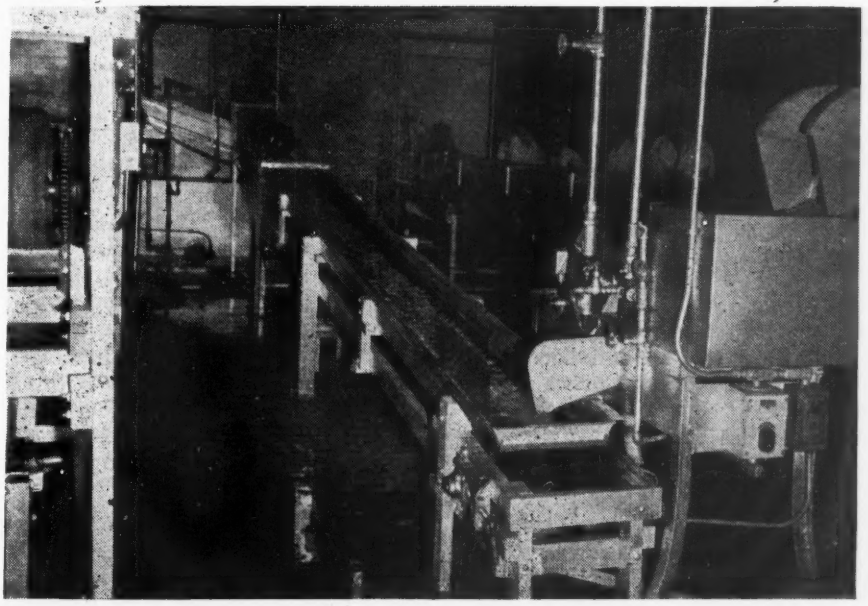


FIG. 4. After the carrots have been peeled and washed free of the caustic solution they are manually inspected and trimmed free of blemishes and damaged spots preparatory to mechanical cutting into slices ⅛ in. thick. The slicer discharges onto a wire-mesh belt which conveys the slices through a hot-water spray and through an SO_2 solution spray preliminary to steam blanching for 4 minutes at atmospheric pressure.

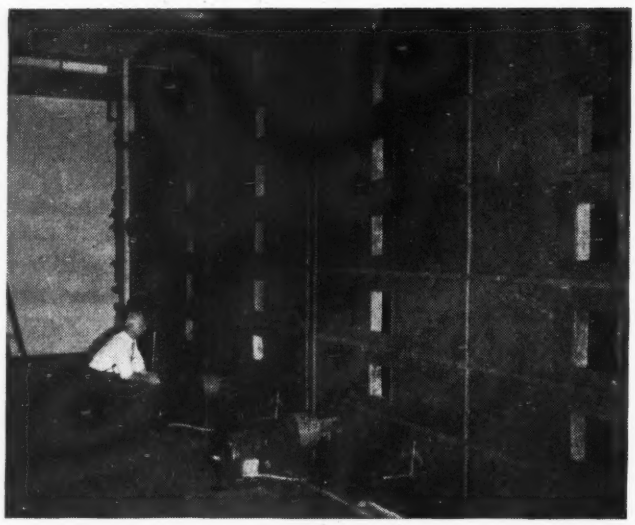


FIG. 6. Windows in sides of dehydrater permit supervision over the performance of each belt in the six superimposed drying tunnels.

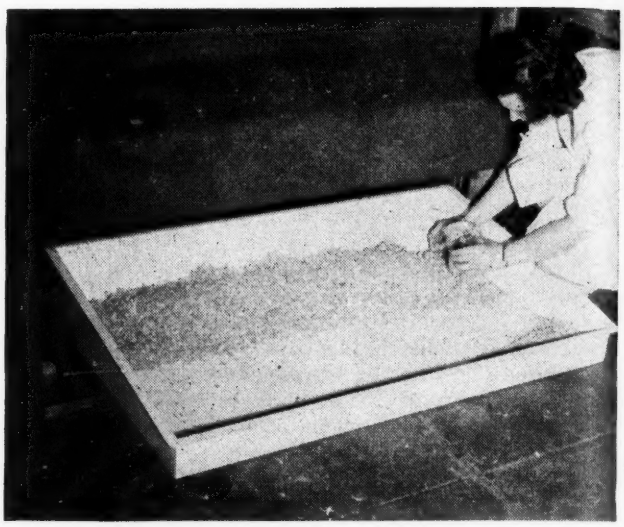


FIG. 7. Within 80 minutes from the time wet sliced carrots are fed into the dehydrater, they are discharged from the finishing belt with a moisture content of less than 5 percent.

operating above each of the five upper belts, as well as by the winnowing action of the heated air. These tedders are individually powered by 1/3-hp. motors through chain drives.

Finishing Belt

The sixth belt, or finishing zone, is a law unto itself when compared with the functioning of the first five belts or drying zones. First of all, its rate of travel is much slower and the travel time of the product through this zone is approximately three times that through all the preceding zones. As the nearly dry particles move through this zone they are subjected to four separate stages or intervals of treatment. These consist of a 15-minute "sweating" time and three 15-minute periods of subjection to alternately vigorous and gentle action of heated air.

During the sweating period, the particles are cut off from any drying effect of moving air, and they obtain their forward movement of 6 ft. solely from the movement of the belt. At the end of this 6-ft. zone of belt travel, the particles are subjected to, and are tumbled about by, an upward current of relatively low-temperature air directed up through the mesh or woven-wire belt at about 4,000 ft. per minute. The temperature of this air varies from 110 to 180 deg. F., depending upon the particular material that is being dried.

By the vigorous action of this current of air, the particles are moved forward about 2 ft. on the belt and freed of their surface moisture. When they have moved forward that 2 ft., the particles accumulate on about a 6-ft. length of the belt and are subjected to a relatively gentle downward current of the heated air. The downward flow of the air in the zone area represented by the 6 ft. of belt length is drected by a baffle over the belt and by the suction of the fan below that portion of the belt.

For the additional 15-minute periods, the particles are subjected to this alternating vigorous and relatively gentle air flow until the full length of the sixth belt or finishing zone has been traveled. At the end of this belt or zone, the air finally is drawn up through the particles by the fan positioned at the end of the fifth belt and the fully dried particles are discharged from the dehydrater as indicated in Fig. 1.

In addition to directing the flow of heated air downward through the product being dried, the baffles in the finishing zone keep the winnowing action of the heated air to a minimum. This retardation and downward direction of air flow causes the particles to accumulate on the belt and heats them sufficiently to promote capillary movement of the moisture inside the particle to its exterior surface. At the end of each of the belts or drying zones, a baffle directs the flow of heated air to the drying zone above and permits the dry light particles to fall gently to the lower belt.

In this general manner, quick dehydration is obtained. Although the average air velocity through this quick-dehydrating system is stated to be 1,500 ft. per minute, both the quantity of air used and the velocity of its flow can be varied in any one zone or in any combination of zones to meet a specific drying need.

How It Works on Carrots

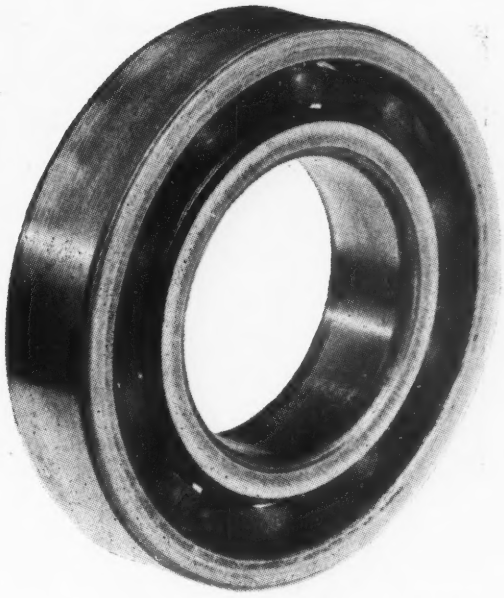
To describe better the working of the Birdseye dehydrater, one can best start with a specific material and follow it through the various steps of preparation and drying. Details of practice vary according to the material being dried, but in the drying of carrots an average procedure is found. The following data pertain to a system engineered for the removal of 3,000 lb. of moisture vapor per hour. The yield of fully dried carrots per hour is that weight of carrots from which 3,000 lb. of water has been removed to leave a residual moisture content of approximately 5 percent.

At the start, the run-of-field carrots are fed into a mechanical washer either by direct dumping or by a conveyor and are soaked momentarily to loosen caked soil. As they are elevated from this water hopper at the rate of 4,000 to 5,000 lb. per hour, they are sprayed with 80 deg. F. water under thermostatic control and fed to a continuous caustic peeler. In the peeler the carrots are subjected to an 18 percent caustic solution at 218 deg. F. for 70 seconds before delivery to a rotary washer for the removal of excess caustic and loosened skin. The rotary washer consists of a perforated stainless steel rotating drum into which tap water is sprayed under a pressure of 150 lb. per square inch. The carrots are given this treatment for 2 minutes to make

(*Turn to page* 220)

HOW TO LUBRICATE Ball and Roller Bearings*

Select lubricant that resists oxidation, washing-off and water absorption, and one that inhibits corrosion. Apply it by proper technic in correct quantity. Here are pointers that will extend bearing wear and cut friction losses



RESISTANCE of a ball or roller bearing lubricant to oxidation is an important characteristic. Gums and lacquers formed by oxidation will very soon interfere with the free rolling of bearing parts. Then, as oxidation progresses, the corrosive tendency also may increase. Equally important under high moisture conditions is the ability of a ball or roller bearing lubricant to prevent rusting. Basically, it requires a lubricating film which will more readily wet a steel surface than will moisture and that will stick tenaciously and resist any washing-off effect of water. Also, the lubricant should absorb water only to a limited extent without appreciable change in physical properties, and it ought to inhibit corrosion.

Sliding friction may be quite a factor in power consumption. It is most likely to occur between the balls and retainers in deep-groove ball bearings, and in roller bearings where the rollers may have become skewed.

Rolling friction is contingent upon the size of the balls or rollers. The smaller these elements, the higher will be the frictional resistance.

Lubrication can in part compensate for sliding friction, although the resultant hydrodynamic pressure must not be overlooked. The friction due to hydrodynamic pressure, or the energy required to churn or push aside the lubricant, may be considerably higher than the normal rolling friction of the bearing elements.

The amount of lubricant charged to the bearing must be carefully considered. An excess can have a definite effect upon the frictional resistance, due to the hydrodynamic pressure. Friction torque in a bearing is lowest with a very small quantity of oil—just sufficient to form a thin film over the contacting surfaces—and with low-viscosity oil.

Spray Lubrication

Oil mist lubrication is most effective in keeping power consumption down, and the parts turning at the required speed without excessive rise in bearing temperature. Mist lubrication usually infers the use of low-pressure air and an external lubricator to develop an atomized mist of oil around the bearing parts. Oil spray lubrication is usually a function of bearing design, flingers being provided on a ring or collar which dips into an oil bath.

As an alternate to oil mist lubrication, bearings designed for oil can be bath-lubricated, pressure fed or served by drip-feed cups. A sealed bath-oiled bearing in which about one-half of the lowest ball or roller is immersed will generally develop the least amount of churning and friction within the oil itself. Pressure-fed bearings usually are fairly well filled with oil. But here the oil is used as a heat transfer agent, and such systems generally are applied to slower speed heavy-duty bearings. Drip-feed lubrication can be positively controlled and is applicable to high-speed service. One drop of oil per hour can safely be maintained with markedly low indication of friction.

When grease is applied by pressure to a moving bearing, the pressure of the gun is to some extent offset by centrifugal force which tends to mold the grease in an evenly distributed layer around the retainer and inner surface of the outer race. Venting the excess of lubricant effectively prevents overlubrication and the possibility of rupturing the bearing seals.

Not all bearings, however, can be relubricated when running. And when the machine is idle, no centrifugal force is developed and it is very easy to over-lubricate. By recording the approximate grease capacity of such bearings and the volume of grease discharged at each stroke of the gun, the amount of grease applied can be better controlled.

Any bearing lubricated by splash or oil circulation is generously flooded with oil as a rule. Control of the amount of oil in any specific bearing usually is considered impracticable.

Unit-lubricated bearings served by oil cups or bottle oilers have their oil level dictated by the level in the oiler. In such bearings it is most practicable to approach the ideal of just enough oil to wet the surfaces without building up an excess which might cause rise in bearing temperatures through internal friction.

*From an article, "Lubrication Progress Paces Ball and Roller Bearing Developments," in The Texas Co.'s technical publication, "Lubrication."

How To Retard Rancidity in Salt-Cured Fish

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FIG. 1. Protective effect of the stabilizing treatment upon brine-cured herring containing 10 to 20 percent oil is shown by the normal fresh-fish color of surface layer in bucket at left. Surface layer in bucket at right has characteristic appearance of untreated herring. Both buckets were stored at 40 deg. F. for approximately 5½ months.

STABILIZATION of salt-cured fish against deteriorative changes during handling and non-refrigerated storage was the objective of the research project initiated by the Q.M.C. Subsistence Research and Development Laboratory early in 1944. It is still underway.

In addition to the possible benefits to the Army in connection with civilian relief feeding, the findings of this study are of potential value in the solution of peacetime feeding problems.

Salt-cured fish products have long been one of the basic sources of protein food for the low-income populations of the world. However, utilization of this protein food in tropical and semitropical countries has been largely restricted to salt fish of the non-oily species, such as the cod. Fish of high fat-content—such as herring, mackerel, mullet and pilchard—could not be profitably salt-cured for hot-climate countries, although they are produced in relatively large volume.

Salt-cured fish of the oily species require handling and storage at temperatures below 35 deg. F. to prevent rapid deterioration. Rancidity develops within a few days, and the fish become inedible within a few weeks if held at 70 deg. F. or higher. Even at refrigerated temperatures, rancidity and "rusting" develop in these oily fish in a few months.

The problem is best understood if the peculiar characteristics of fish oils are kept in mind. From a food-fish standpoint, only the body oils of the true fishes (teleostomi) need be considered. These fish oils comprise, primarily, glycerides of the fatty acids. In that respect they are similar to fats and oils of animal or vegetable origin. Fish oils differ in that they have a greater percentage of unsaturation than usually is found in corresponding animal and vegetable fats and oils.

Fish oils contain glycerides of fatty acids with from 14 to 24 carbon atoms. The unsaturation usually is not greater than –2H in the C_{14} and C_{16} series, –4H in the C_{18} series. But in the C_{20}, C_{22}, and C_{24} series, it may exceed –10H. Total saturated fatty acids may vary from 10 to nearly 30 percent, of which palmitic acid forms the greater part. Degree of unsaturation is indicated in Table I[1].

A concept of the relative unsaturation and rancidity problem encountered with fish oils may be obtained from Table II.

For convenience, the more common species of fish used domestically may be divided into two types, based upon fat content (Table III).

In considering rancidity as a problem in fish products, emphasis was placed upon those forms in which relatively prolonged storage life is required. Such fish products are produced in the following forms: (1) Canned, (2) frozen, (3) salted, (4) smoked, (5) dried, (6) combinations of two or more of the frozen, salted, smoked and dried.

Canned fish do not present much of a problem in respect to deteriorative changes, because when vacuum packed and heat-processed, no appreciable rancidity is encountered. In the other processed forms, however, rancidity presents a serious problem, often resulting in greater loss than that caused by decomposition.

Frozen fish require careful treatment to prevent deterioration. Such fish are stored "in the round" ("whole," as caught), "dressed" (eviscerated, head on or off), and packaged. The present commercial trend is to prepare an increasing proportion in the form of boneless fillets, wrapped and packaged in uniform-size containers. Frozen fish are more susceptible to deterioration than frozen meat, and for that reason must be stored at a temperature of from 10 to 20 deg. F. lower than meat to obtain an equivalent storage life. Lower temperatures are required, particularly for the fatter types of fish, because they are susceptible to an oxidative deterioration which, in addition to the development of a rancid flavor, is indicated by the development of a yellowish brown surface discoloration, known as "rusting."

Loss of moisture and development of rancidity, accompanied by rust, are the principal causes of deterioration of stored frozen fish. The preventatives at present are glazing and storage at low temperatures.

Since low temperatures promote loss of moisture and high temperatures promote rusting, it has been necessary to arrive at some compromise point where deterioration upon storage is at a minimum. Such a compromise is unsatisfactory at best, since at any tempera-

Even fatty fish are given additional storage stability of five to six months by coating with edible oil that contains an antioxidant and a benzoate preservative. The treatment is applicable to other fat-containing foods

ture low enough to prevent rust, dehydration will take place rapidly; and at any temperature high enough to retard drying noticeably, fat fish will rust rapidly. Present procedure in coping with this situation is: (1) Prevent dehydration by glazing, aided by wrapping if necessary; (2) prevent rusting by maintaining a temperature of –20 deg. F. or lower. At low temperatures, very fat fish, if kept thoroughly glazed, may be kept for months with little or no signs of rust. Low temperatures are more expensive to maintain than are high; but the increased cost is necessary to maintain the stored fish in marketable condition.

Salted fish are preserved primarily through the inhibitory action of the relatively high salt content on growth and activity of microorganisms. A concentration in the fish of at least 20 percent salt is required before inhibition of deterioration is effected.

Tressler[2] has estimated that the quantity of salt mackerel lost because of the "rusting" of the fat is between 10 and 25 percent of the entire pack. In normal years, the United States pack of mackerel alone has a wholesale value of over $1,000,000. In addition, with salted herring and alewives—which are even more difficult to keep—the losses usually are greater.

Even fish of the leaner species deteriorate after long storage. But because of their low oil content, the flavor is not affected as seriously.

Salt fish are produced in one or the other of two general forms: (1) Dry salt pack with the moisture content reduced by drying or pressing out the free liquid, or (2) brine salt pack, in which the salted fish are packed in saturated salt brine. In either form products prepared from fatty type of fish are subjected to intimate contact with salt under conditions long recognized as conducive to oxidation and rancidity of fats.

Smoked fish are protected to a limited degree by the phenolic constituents of the smoke, which exert antioxidant and preservative properties, as well as by the reduced moisture content resulting from the smoking treatment. Smoked fish usually are salted or dried, or both. Smoking tends to mask initial rancidity flavors.

Dried and dehydrated fish are susceptible to rancidity and, in the main, enjoy little popularity except among such people as the Eskimo and Orientals, to whom the rancid flavor is not objectionable.

Evidences of Rancidity

In fish products, the fatty components deteriorate because of hydrolysis, rancid-flavor development and rusting. Information reported in the literature on the subject indicates that the three conditions usually are intimately related. Certainly, with fish products, particularly the salt-cured, hydrolysis must occur to a relatively advanced degree before organoleptic detection is possible, because of the fish odors and flavors characteristic of such products. Hydrolysis in itself has not been considered very serious, except as it is usually accompanied by rancidity and rusting. Rancidity is characterized by the development of undesirable odors and flavors. In fish products, particularly frozen or salt-cured, it is accompanied by rusting. Rusting is characterized by the formation of a reddish brown scum on the surface of frozen fish. Salt-cured fish develop a similar reddish brown discoloration on the surface and everywhere else that fish oil may be. In the case of brine-packed fish, a layer of liberated fish oil collects on the surface of the brine, adheres to the sides and inner lid of the container, and clings to the fish when withdrawn, further contaminating the fish with the products of rancidity.

Since the problem under study was the development of rancidity in fish oils, stabilization of the fish oils by means of antioxidants was considered the most practicable approach to a solution. Data accumulated by the Subsistence Research and Development Laboratory on the use of antioxidants in fats and oils, particularly lard and shortening, were especially helpful in this work. The antioxidant, nordihydroguaiaretic acid, appeared to offer the greatest promise.

In independent, unrelated work, Tarr[3] proposed that use be made of a water-soluble antioxidant for fish products, particularly for brine-cured fish. He held that the antioxidant would have to be soluble in water so that it could be added to the liquid packing medium, and also that it would have to be quite inexpensive and relatively nontoxic. In the work at the Subsistence Research and Development Laboratory, our conclusion was that an antioxidant relatively insoluble in water is preferable. Such an antioxidant, dissolved in a stable edible fat, could be brought into intimate contact with the fish product (whether in brine, dry salt, dried, smoked or frozen) by dipping the fish product into a liquified fat containing the antioxidant. The fat would subsequently cool to form a protective film or envelope about the fish. In this practice the cost of the antioxidant became sec-

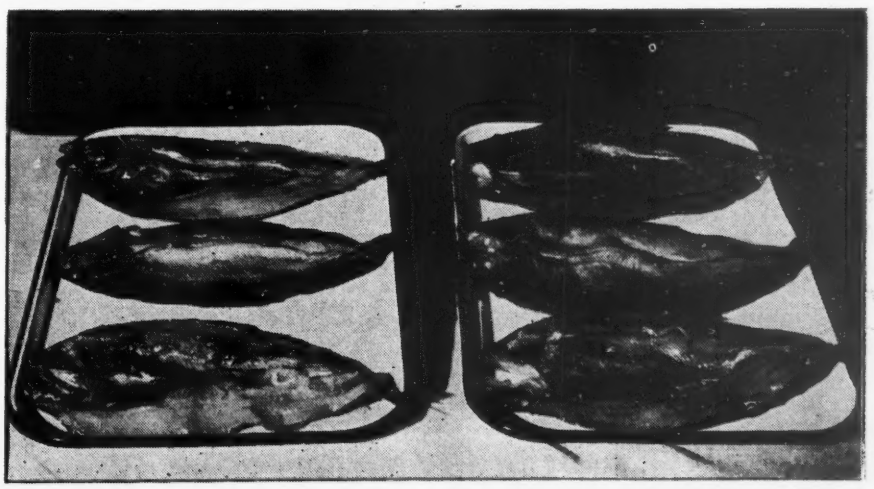

FIG. 2. By contrasting the colors of the treated herring (left) and the untreated (right) against a white background, the effect of "rusting" and rancidity development become marked. The fish shown are from the buckets in Fig. 1.

ondary because the relatively low proportion of antioxidant as compared to weight of fish would not materially increase the cost of the stabilized product.

After a review of the problem, state of the prior art, and possible avenues of approach to a solution, we proposed the following technic: "That an antioxidant or synergistic combination of antioxidants be dissolved in a carrier of edible fat of a type that is solid at room temperature and relatively resistant to oxidation because of its chemical nature, and that the fish, after completion of the normal commercial salting process, be dipped in the liquified fat which, upon cooling, forms a thin, solid coating. During storage, the fish oil, upon liberation from the fish, is absorbed into the coating and thus obtains the benefit of the protective action of the antioxidant in the coating."

We subsequently found that, in addition to oxidative rancidity, microbiologic and enzymic activity caused both rancidity and protein decomposition, particularly at elevated temperatures of 80 to 100 deg. F. Inclusion of approved, nontoxic substances in the curing salt which would retard bacterial and enzymic activity, in combination with the antioxidant coating, was therefore investigated.

A preliminary laboratory experiment on salt-cured herring provided definite indication of the value of the modified stabilization process. Results are shown in Table IV. A subsequent laboratory experiment on salt mackerel demonstrated that the process definitely stabilized this salt fish for a period of months. Results of the salt mackerel are in Table V.

Fish were salted until "struck," (or enough salt has been absorbed) then repacked in ½-gal. glass jars, loosely stoppered with glass covers. Upon standing, fish oil was liberated from the fish, absorbed into the coating and eventually collected as an oily layer above the surface of the brine. Fish were withdrawn at periodic intervals for examination. Samples of the surface oils and fish were taken for chemical analyses and organoleptic tests. Judgment as to the condition of samples was based primarily on organoleptic tests, but the peroxide values (expressed in the usual way as milliliters of 0.002 N sodium thiosulfate per gram of fat) of the surface and extracted body oils were used as criteria for following the changes in the quality of the fish. Peroxide values obtained are found in Table VI.

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TABLE I. Relationship of Unsaturated and Saturated Oils in Various Fish. in Percent by Weight.

Kind of fish	Saturated oils of C_n classification			Unsaturated oils of C_n classification					
	C_{14}	C_{16}	C_{18}	C_{14}	C_{16}	C_{18}	C_{20}	C_{22}	C_{24}
Pacific pilchard	5.1	14.4	3.2	Trace	11.7 (—2)	17.6 (—3.3)	17.9 (—4.1)	13.8 (—8.5)	15.2 (—10.9)
Halibut	4.0	14.8	3.2	Trace	6.5 (—2.6)	23.8 (—3.0)	26.9 (—5.2)	23.3 (—6.5)	... ...
Herring ..... (July with 20.7 per cent fat)	8.3	12.1	0.3	0.5	6.4 (—3.4)	21.0 (—4.5)	28.3 (—5.5)	23.1 (—4.6)	... ...

Figures in parentheses indicate relative unsaturation; —2 indicates 1 double bond and —3.3 indicates a mixture of saturated and unsaturated oils containing no double bond and 1 double bond.

TABLE II. Iodine Values of Some Fats.

Coconut oil	7- 11
Lard	46- 70
Corn oil	111-130
Herring oil	115-154
Salmon oil	133-166
Linseed oil	173-185
Pilchard oil	176-186

TABLE III. Common Species of Edible Fish Classified According to Fat Content.

Type I
Fat Varieties

Species	Approx. average fat content in percent of weight
Alewife	5
Butterfish	11
Catfish	21
Ciscoe	7
Eels (salt water)	9
Eulachon (Columbia River smelts)	11
Halibut	5
Herring	7
Mackerel (all varieties)	7
Mullet	5
Pompono	8
Porgie	5
Salmon	18
Shad	10
Tuna (albacore)	10
Whitefish	7

Type II
Lean Varieties

Species	Approx. average fat content in percent of weight
Bass	0.5
Blackfish	1.3
Bluefish	1.2
Buffalo fish	2.3
Cod	0.4
Flounder	0.6
Haddock	0.3
Hake	0.7
Perch	0.8
Pike	0.5
Pickerel	0.5
Pollock	0.8
Red Grouper	0.6
Red Snapper	1.0
Skate (rajafish)	1.4
Smelt	1.8
Sole	0.7
Tomcod	0.4
Whiting	0.4

TABLE IV. Effect of Treating Brine-packed, Salt-cured Herring to Retard Rancidity at 100 Deg. F. Storage.

	Condition* after				
	2 weeks	3 weeks	1 month	2 months	3 months
Control	Rancid	Very rancid	Vary rancid	Very rancid	Very rancid
Treated (A)...	Good	Good	Good	Slightly rancid	Rancid
Treated (B)...	Good	Good	Good	Good	Slightly rancid

*With regard to rancidity, not protein decomposition.

A. Coated with partially hydrogenated cottonseed oil, plus 0.2 percent nordihydroguaiaretic acid.

B. Coated with partially hydrogenated cottonseed oil, plus 0.2 percent nordihydroguaiaretic acid with addition of 0.1 percent benzoic acid.

TABLE V. Effect of Treating Brine-packed, Salt-cured Mackerel To Retard Rancidity at 70 to 80 Deg. F. Storage

	Condition after				
	1 month	2 months	3 months	4 months	5 months
Control	Rancid*	Very rancid	Very rancid	Very rancid	Very rancid
Treated (A)..	Rancid*	Very rancid	Very rancid	Very rancid	Very rancid
Treated (B)..	Good	Good	Good	Slightly rancid	Rancid
Treated (C)..	Good	Good	Good	Good	Slightly rancid
Treated (D)..	Good	Good	Good	Slightly rancid	Rancid

*After 10 days.

A. Coated with refined coconut oil.

B. Coated with refined coconut oil, plus 0.2 percent nordihydroguaiaretic acid.

C. Coated with refined coconut oil, plus 0.2 percent nordihydroguaiaretic acid with addition of 0.1 percent ethyl vanillate in brine.

D. Coated with refined coconut oil, plus 0.2 percent nordihydroguaiaretic acid with addition of 0.1 percent methyl paracept in brine.

TABLE VI. Peroxide Values of Surface and Extracted Body Oils From Salt-cured Mackerel Treated as Indicated in Table V.

Sample No.	Storage time in days: 0	42	63	91	121	149
	Peroxide number of oil					
Surface oil						
1	3.9	198.0*	318.0	194	280	135
2	3.9	64.0*	266.0	132	254	93
3	3.9	5.5	13.7	15	110*	111
4	3.9	3.8	11.4	14	25	54*
5	3.9	5.2	10.8	16	51*	177
Extracted body oil						
1	3.9	13.9*	21.5	59.0	35	67
2	3.9	24.3*	33.6	9.8	20	43
3	3.9	9.9	18.2	5.8	27*	82
4	3.9	7.1	7.2	42.0	47	52*
5	3.9	11.1	6.3	90.0	46*	116

*Peroxide number at which rancidity was detected organoleptically. Fish in Samples Nos. 1 and 2 were rancid after 10 days of storage.

SANITARY Candy Manufacture

By WALTER H. EDDY, New York, N. Y.

Confectioners and equipment manufacturers take a critical look at cleanliness. Eighteen objectives listed. Case for copper presented

RECOGNITION that candy is more than a luxury—is in fact an essential food in war—focused attention on conditions of manufacture. One result has been a review of the utensils the candy maker uses.

At a recent meeting of confectioners and candy utensil manufacturers, an official of the New York City Board of Health outlined the following 18 objectives in the interest of public health.

1. Ease of cleaning.
2. Reduction of repair and maintenance costs.
3. Contact surfaces easily cleaned.
4. Elimination of dead-ends.
5. Elimination of open seams in the product zone.
6. Avoidance of the use of lead, antimony and cadmium.
7. Securing of smooth and continuous surfaces.
8. All junctions rounded or coved.
9. All parts of the product zone accessible to hand-brush cleaning.
10. All parts easily dismantled.
11. Protection from lubricants and condensates.
12. Elimination of stuffing boxes; rotary seal permissible.
13. Agitator blades and panels one piece with shaft or welded to shaft and removable at a point outside of the product zone.
14. All pipe fittings with a standard thread.
15. No threaded parts inaccessible for clearing and no inside threads.
16. Plug-type valves preferred.
17. Run-off valve installed as close to the kettle as possible.
18. Coupling nuts on piping and valves with sufficient clearance (three times width of the nut) or removable or capable of taking apart.

One of the oldest and most commonly used metals employed in the fabrication of candy kettles is copper. But today, other metals and alloys are available. What has copper to offer in comparison with these other materials?

It is generally agreed by health authorities that copper kettles offer no menace to health and no damage to the ingredients in candy. Small amounts of copper are essential in the diet for the conversion of iron into red blood pigment, and candies made in copper kettles never dissolve enough copper to provide toxic quantities. True, traces of copper can destroy the antiscurvy vitamin C, but that vitamin is not present in candy mixes.

One great advantage of copper over other metals is its high thermal conductivity (0.90 c.g.s. units at 100 deg. C. compared to 0.52 for aluminum, 0.069 for stainless steel). That means efficient transfer of heat from kettle to candy mix.

It is admitted that the rate of heat transfer from the steam in the jacket to the candy in the kettle is determined only partly by the metal characteristics and partly by surface conditions and films formed on the metal surface. In the presence of heavy films or surface coatings, the temperature drop through the metal could be a small part of the total temperature drop from steam to candy. But that part of it through the kettle wall would invariably be least with copper; much greater with aluminum or stainless steel. And from the very nature of the product being made and the degree of cleanliness required, it seems unthinkable that any coatings would be built up on the inside of the kettle. Copper means, then, maximum utilization of heat and speed of cooking.

The high conductivity of copper also offers another advantage. It's the metal best adapted to offset inequalities in heat distribution in the kettle itself.

Copper has one other merit worth mentioning. Stirring, by increasing the velocity of the candy with respect to the kettle surface, accelerates the rate of heat transfer. The more violent the stirring, the more effective is the thermal conductivity of the kettle in relation to the total rate of heat transfer. And the advantage of copper over other kettle-fabricating materials becomes more manifest.

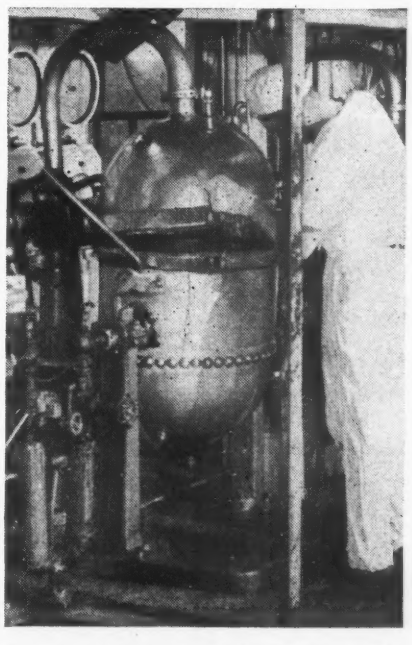
The point has been raised that the pitting of kettles sometimes occurs from galvanic corrosion due to contact of dissimilar metals in an electrolyte. Candy, of course, is rarely a strong electrolyte, and the probability of ill effects from the contact of unlike metals would be small. But if, under special conditions, a strong electrolyte were present, the following general conclusions seem warranted:

1. There would never be any difficulty from a combination of two copper or copper and nickel alloys, from two aluminum base alloys, or from a combination of various types of stainless or other steels.

2. Appreciable galvanic attack could be expected if copper alloys, on the one hand, and either aluminum alloys or steel were in contact with each other and the electrolyte at any point.

Riveted or seamed surfaces are no longer necessary when using copper, since it can be welded to form continuous, smooth surfaces.

Copper, then, still has a justifiable claim to recognition by the candy maker.



Copper kettles still meet all the requirements of the sanitary candy plant.

VANILLIC ACID ESTERS As Food Preservatives*

By IRWIN A. PEARL and JOHN F. McCOY
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Here is a detailed report on the effectiveness of vanillic acid esters in inhibiting three types of aerobic microorganisms found in food products. It includes studies on bread, cheese spreads, fish and fruit juices

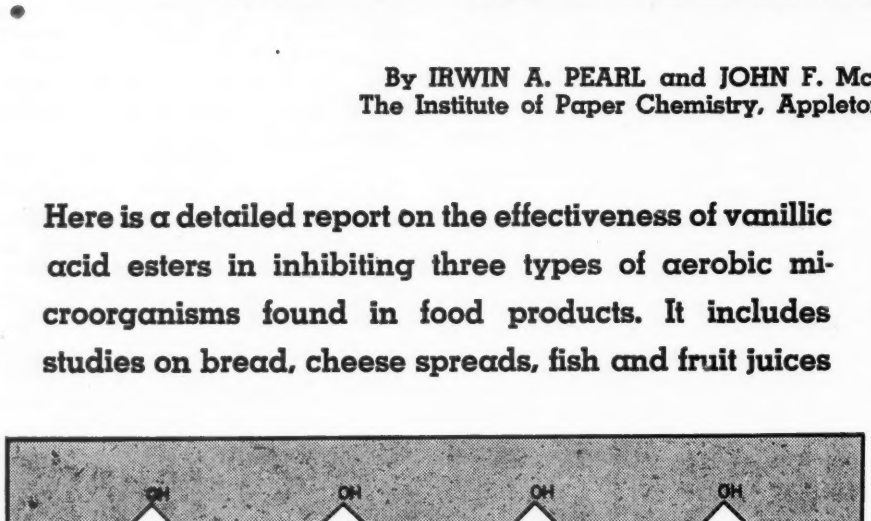

FIG. 1. Chemical structures of (1) para-hydroxybenzoic acid, (2) guaiacol, (3) vanillic acid, (4) vanillic acid ester (ethyl vanillate).

IN the course of the investigation of the chemical reactions of vanillin, processes have been discovered for the economical production of vanillic acid,[1] as indicated in the preliminary report in the October FOOD INDUSTRIES (page 99). Heretofore, there has been no satisfactory method for this transformation and, consequently, vanillic acid has been more or less of a laboratory curiosity, although vanillin has been produced in millions of pounds yearly.

Need for Preservatives

During the past several years, the need for nontoxic food preservatives for use in perishable foodstuffs shipped or stored without the benefit of refrigeration has been acute. At present, sodium benzoate is the only preservative used for this purpose. This compound, however, has failed to solve many of the important food-preserving problems. The use of preservatives, in general, is discouraged by the Food and Drug Administration, wherever good and sanitary commercial practice yields a product which requires no preservative to maintain it in satisfactory condition until used. But the extreme conditions of time and temperature applicable to certain military subsistence alters this situation sufficiently to make the use of effective nontoxic preservatives desirable.

The esters of para-hydroxybenzoic acid have received considerable attention as preservatives in general, and, in fact, have been used to a considerable extent in foods in Europe. A complete literature survey of the use of the para-hydroxybenzoates, including their use in foods, has been made by Neidig and Burrell.[2] The para-hydroxybenzoates have not been approved by the Food and Drug Administration for use in foods. Because vanillic acid is actually a derivative of para-hydoxybenzoic acid, because the guaiacyl radical has inherent therapeutic properties, and because of the possibility of plentiful vanillic acid, the esters of vanillic acid were investigated for their food-preserving properties. (See Fig. 1 for structural relationships.)

A search of the literature revealed that the application of vanillic acid esters as preservatives had been anticipated to some extent. Sabalitschka and Tietz,[3] while studying the antimicrobic properties (as evidenced by inhibition of the fermentation of glucose by yeast) of hydroxy acids and their derivatives, prepared and tested several esters of vanillic acid. These authors found that the vanillic acid esters were good inhibitors of glucose fermentation and that, in general, the effectiveness improved with increased molecular weight.

The lower alcohol esters of vanillic acid were prepared by simple esterification reactions and were obtained as colorless, low-melting solids very slightly soluble in water and readily soluble in alkaline solutions and in most organic solvents. The approximate percentage solubilities in water of the lower alcohol esters of vanillic acid are: methyl, 0.2; ethyl, 0.3; *n*-propyl, 0.075; isopropyl, 0.03; *n*-butyl, 0.02; and isobutyl, 0.01.

Test Organisms and Technics

It was desired to test these esters against three types of aerobic microorganisms — namely, nonspore-forming and spore-forming bacteria and molds which may cause spoilage of foodstuffs or are likely to be found in contaminated food samples. The results being reported are based upon the inhibiting concen-

*This paper represents a portion of the results obtained in the research program sponsored by the Sulphite Pulp Manufacturers' Committee on Waste Disposal and conducted for the Committee by The Institute of Paper Chemistry. Acknowledgment is made by the Institute for permission on the part of the Committee to publish these results.

A brief preliminary report on these preservatives, by Mr. Pearl, was published in the October issue of "Food Industries." At that time, the additional details presented in this article were not available. The slight amount of repetition occurring is for reader convenience.

trations of the compounds which have been determined for the test organisms. The inhibiting concentration is defined as the lowest concentration of the preservative which will completely inhibit the growth of the test organism. *Aerobacter aerogenes* was selected as a representative species of aerobic nonspore-forming bacteria. The strain (originally obtained from the University of California) used in this study is encapsulated and was found by Appling and McCoy[4] to be exceedingly resistant to chemical agents. This was evidenced by the fact that 0.0225 percent of the very powerful bactericide, sodium pentachlorophenate, was required for inhibition only. *Bacillus mycoides* was selected as a representative species of aerobic spore-forming bacteria. This culture, which was isolated from a paperboard sample, was found by Appling and Shema[5] to be very heat resistant. *Aspergillus niger* was selected as a representative species of the fungi commonly designated as molds.

Stock solutions of the vanillates were prepared by dissolving the required amount of each in a very slight excess of normal sodium hydroxide solution to convert them to their respective sodium salts and adding distilled water to bring the solutions to the volume and concentration desired.

The concentrations of the preservative to be tested were then well mixed with melted sterile Bacto nutrient agar at about 46 deg. C. and allowed to harden. In all cases, the resulting mixture was acid in reaction and, therefore, the vanillates were present as the free esters. Meanwhile, a water suspension of the test organism, *Aerobacter aerogenes*, was prepared from a 24-hour bottle slant incubated at 37 deg. C. The entire growth was aseptically washed from the slant into a dilution bottle containing 100 c.c. of sterile water. Each poured plate was divided into two parts and streaked separately with a 3-mm. loopful of the test organism. After streaking, the plates were incubated at 37 deg. C. for 24 hours, or longer if necessary, to obtain good growth. When using *Bacillus mycoides* as the test organism, a 4-day bottle slant incubated at 37 deg. C. was made to prepare the water suspensions for streaking the plates, and the incubation period was 48 hours.

In the case of *Aspergillus niger*, the testing technic differed from that used for the two bacterial species in several ways. Malt agar re-

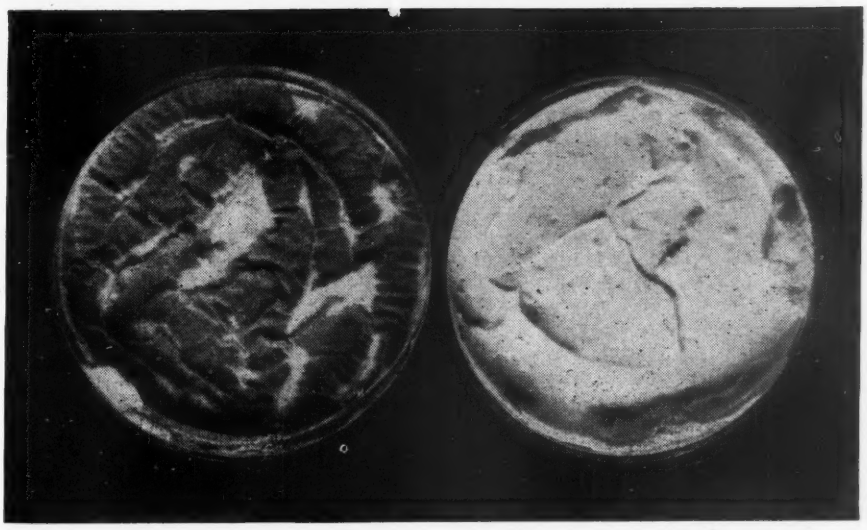

FIG. 2. Chive cheese spread after 4 days. Sample at left is control, that at right was treated with 0.10 percent ethyl vanillate. These samples of chive cheese, as well as the samples of the other cheeses studied, were placed in Petri dishes, inoculated with 1.0 c.c. of a spore suspension of a green mold isolated from moldy cream and incubated at 30 deg. C.

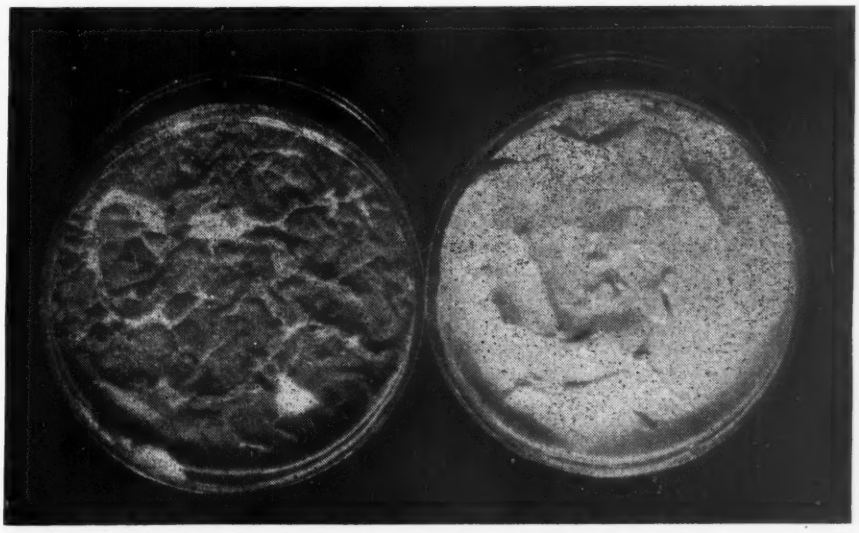

FIG. 3. Pimento cheese spread after 4 days. Control is at left. Sample at right was treated with 0.10 percent ethyl vanillate.

FIG. 4. Limburger cheese spread after 4 days. At left is the control. At right is sample treated with 0.10 percent ethyl vanillate.

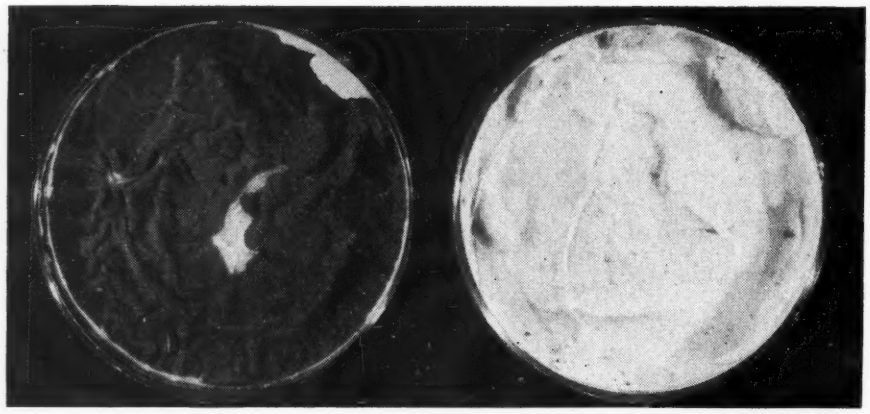

FIG. 5. Chive cheese spread after 6 days. Left, control. Right, sample treated with 0.10 ethyl vanillate.

placed Bacto nutrient agar. The inoculum was a spore suspension, prepared by transferring to a bottle containing 50-c.c. of sterile water and glass beads, several portions of sporangia from a 7-day old malt agar tube slant of the test organism and shaking vigorously. Instead of streaking the plates, a 3-mm. loopful of suspension was placed at each of two diametrically opposite spots on the malt agar surface. The plates were incubated at 30 deg. C. for 7 days before recording the data.

The range of concentrations tested for each compound and each organism was from 0.030 to 0.210 percent, with increments of 0.060 percent. If the concentration of preservative required to inhibit the growth of the test organism was greater than 0.210 percent, it was reported as such. If the inhibiting concentration was found to be lower than 0.030 percent, a range of concentrations from 0.0030 to 0.030 percent, with increments of 0.0060 percent, was tested. The results of these tests are summarized in Table I. This study indicated that the lower alkyl esters of vanillic acid are especially effective against spore-forming heat-resistant bacteria and against molds, and that, in general, the antimicrobial efficiency increased with increasing molecular weight.

Studies on Bread

Actual food preservation studies were then initiated. The first study was made on bread. Two identical batches of bread were baked by a commercial bakery. To one batch was added, during the mixing of the dough, 0.1 percent (based on the weight of the dough) of powdered *n*-butyl vanillate. In the first experiment, six slices (one from each load) each of both treated and untreated bread were cut and allowed to stand uncovered overnight. Approximately 16 hours later, these slices were sprayed with distilled water and then incubated at 30 deg. C. in a desiccator over water. The samples were examined after 2, 4, 5 and 7 days. After 2 days, all samples appeared normal. After 4 days, several of the untreated slices had Penicillium colonies and considerable growths of Rhizopus as evidenced by the thick white characteristic aerial hyphae. All of the treated samples appeared normal. The same was true after 5 days, but more growth appeared on the untreated slices. After 7 days, mold growth appeared on all slices of bread. However, the untreated slices were more thickly covered than were the treated slices.

In the next experiment, six slices each of both treated and untreated bread were sprayed with 1 c.c. of a mixture of spore suspensions containing 3,800,000 *Aspergillus niger* spores per cubic centimeter and 1,400,000 *Penicillium expansum* spores per cubic centimeter, re-

TABLE I. Comparison of Inhibiting Concentrations for Three Test Organisms.

Compound	Inhibiting concentration, percent by weight, for: Aerobacter aerogenes	Bacillus mycoides	Aspergillus niger
Methyl vanillate	>0.2100	>0.2100	0.2100
Ethyl vanillate	>0.2100	0.1500	0.0900
n-Propyl vanillate	>0.2100	0.0900	0.0900
Isopropyl vanillate	>0.2100	0.0900	0.0900
n-Butyl vanillate	>0.2100	0.0150	0.0900
Isobutyl vanillate	0.2100	0.0210	0.0300

Editor's Note: The symbol > means "greater than."

TABLE II. Unopened Sliced Bread at 100 Deg. F. and 90 Percent Relative Humidity.

	4 days Unopened	5 days Unopened	5 days Opened	9 days Opened
Treated with ethyl vanillate	No growth	No growth	No growth	Fair growth
Control	No growth	Good growth	Good growth	Excellent growth

TABLE III. Sliced Bread Opened Before Incubation.

	4 days (A)	4 days (B)	5 days (A)	5 days (B)
Treated with ethyl vanillate	No growth	No growth	Poor growth	Very poor growth
Control	Fair growth	Good growth	Good growth	Excellent growth

TABLE IV. Unsliced Bread Cut with Sterile Knife (5-day Results).

	(A)	(B)	(C)
Treated with ethyl vanillate	Poor growth	Poor growth	Poor growth
Control	Good growth	Good growth	Good growth

TABLE V. Screening of Vanillic Acid Esters as Cheese Preservatives.

Cheese Product	Vanillate Used	2-day results	3-day results	4-day results	6-day results
Chive cheese spread	Isobutyl	Slight green	2 + green	2 + green	3 + green
Chive cheese spread	.....	Slight green	3 + green	3 + green[1]	4 + green[4]
Chive cheese spread	Ethyl	None	None	None[1]	None[4]
Pimento cream cheese spread	Ethyl	None	None	1 + green[2]	2 + mycelium 1 + green
Pimento cream cheese spread	.....	Slight green	3 + green	4 + green[2]	4 + green
Philadelphia cream cheese	*n*-Propyl	None	None	None	None
Philadelphia cream cheese	.....	None	None	1 + green—yeasty odor	2 + mycelium
Roka cheese spread	*n*-Butyl	None	None	2+ mycelium, slight green	2 + green
Roka cheese spread	.....	Slight green	Heavy mycelium, 1 + green	4 + green	4 + green
Old English cheese spread	Isobutyl	None	Slight mycelium growth	Slight mycelium growth	2 + mycelium
Old English cheese spread	.....	Slight green	Heavy mycelium, 1 + green	3 + green	4 + mycelium
American spread	Sec. butyl	None	Moderate mycelium growth	3 + mycelium growth	3 + green
American spread	.....	Slight green	3 + green	4 + green	4 + green
Pineapple cheese spread	Isoamyl	None	Heavy mycelium growth	4 + mycelium, 2 + green	4 + green
Pineapple cheese spread	.....	Slight green	3 + green	4 + green	4 + green
Limburger cheese spread	Ethyl	None	None	None[3]	None[5, 6]
Limburger cheese spread	.....	None	Moderate mycelium growth	2 + green[3]	3 + green[6]

[1]See Fig. 2. [2]See Fig. 3. [3]See Fig. 4. [4]See Fig. 5. [5]Still good after 34 days. [6]See Fig. 6.

spectively. These slices were incubated over water in a desiccator and examined after 2, 4, 5 and 7 days as in the previous experiment. After 2 days, brown spores of *Aspergillus niger* appeared on all of the untreated samples, but all of the treated samples were free of mold growth. After 4 days, all of the untreated samples were covered with mold spores and several of the treated slices had one or two colonies of Aspergillus. After 5 days, all growths had progressed somewhat and after 7 days, all the slices were covered with Aspergillus growth. The untreated slices had decomposed, whereas the treated slices still possessed some rigidity. All of these slices were more decomposed than those of the first experiment.

The consensus of the 30 to 40 people who tasted the two breads was that there was no difference in taste.

Several who imagined a taste difference were unable to tell which was the treated product.

Two identical batches of bread were again baked, but in this case 0.1 percent ethyl vanillate was used as a preservative in one of the batches. Seven loaves of each batch were sliced at the bakery before wrapping.

In the first experiment with these batches of bread, duplicate unopened sliced loaves were incubated at 100 deg. F. and 90 percent relative humidity. The loaves were examined unopened at 4 days, one unopened and one opened at 5 days (opened loaf discarded at this time) and one opened at 9 days. The results are given in Table II. The molds appeared to be of all varieties and appeared on the surface of the loaves and on the faces of the individual slices.

In the next experiment, the sliced loaves were removed from the waxed wrapper, each slice momentarily exposed and then immediately rewrapped. The experiment was performed in duplicate. Both loaves were then incubated at 100 deg. F. and 90 percent relative humidity. The loaves were examined after 4 and 5 days and the results are given in Table III.

In the last experiment, the unsliced loaves (in triplicate) were sliced with a sterile knife at one end and in the middle, and the loaves were then rewrapped and incubated as before. After 4 days, they were examined through the wrappers; only the control loaves possessed any mold growth. After 5 days they were opened and examined, the results being found in Table IV.

Of all the persons who tasted these breads, no one could detect any taste to the ethyl vanillate-treated loaves.

The data of these experiments indicate that, even under these drastic conditions (which could never be obtained under any operating conditions), butyl vanillate and ethyl vanillate were effective in retarding the appearance of mold growth on bread.

In the first experiment on the preservation of cheese spreads against molds, a screening test was made to find which types of cheese spreads were most susceptible to mold and also to determine which of the esters of vanillic acid was the most effective in a cheese spread medium. Eight commercially packed cheese spreads were obtained. Samples (50.0 grams) of these cheeses were thoroughly mixed under aseptic conditions with 0.05 gram of a vanillic acid ester, giving a product containing 0.1 percent preservative. These treated samples and their respective controls (no preservative) were each placed in Petri dishes, inoculated

(*Turn to page* 230)

Table VI. Prevention of Mold in Cheese Spreads by Means of Ethyl Vanillate.

Cheese product	Vanillate used	3-day results	5-day results	8-day results
Chive cheese spread	Ethyl	None	None	None
Chive cheese spread	None	2 + green	4 + green	4 + green
Pimento cream cheese spread	Ethyl	None	None	1 + white
Pimento cream cheese spread	None	2 + green[1]	4 + green	4 + green
Pineapple cheese spread	Ethyl	None	None	None
Pineapple cheese spread	None	3 + green	4 + green	4 + green
Limburger cheese spread	Ethyl	None	None	None
Limburger cheese spread	None	Few scattered colonies	1 + green	2 + green
Roka cheese spread	Ethyl	None	None	None
Roka cheese spread	None	None	4 + green	4 + green

[1]Mold growth apparent at 2 days.

TABLE VII. Herring Fillets at Room Temperature.

Days control	Ethyl vanillate	Isobutyl vanillate
6 Yellow color, rancid odor	Unchanged in color and odor	Unchanged in color and odor
13 Yellow color, rancid odor	Sight yellow color, slight rancidity	Unchanged in color and odor
21 Yellow color, very rancid odor	Light yellow color, trace of rancidity	Unchanged in color and odor
34 Yellow color, very rancid odor	Light yellow color, trace of rancidity	Unchanged in color and odor
57 Yellow color, very rancid odor	Light yellow color, trace of rancidity	Unchanged in color and odor

TABLE VIII. Preservation of Apple Juice and Tomato Juice.

Product	Vanillate	2 days	4 days	18 days	41 days	120 days[1]
Apple juice	.....	Slight growth	2 + green	3 + green	4 + green	4 +[2]
Apple juice	Isobutyl (0.01%)	No growth	None	None	None	None
Tomato juice	.....	Slight growth	3 + green	4 + green	4 + green	4 +
Tomato juice	Ethyl (0.10%)	No growth	None	None	None	None
Tomato juice	*n*-Propyl (0.10%)	No growth	None	None	None	None
Tomato juice	*n*-Butyl (0.01%)	No growth	None	None	1 + green	4 +
Tomato juice	Isobutyl (0.01%)	No growth	None	None	None	None

[1]Considerable evaporation had taken place. [2]Still possessed original sweet odor.

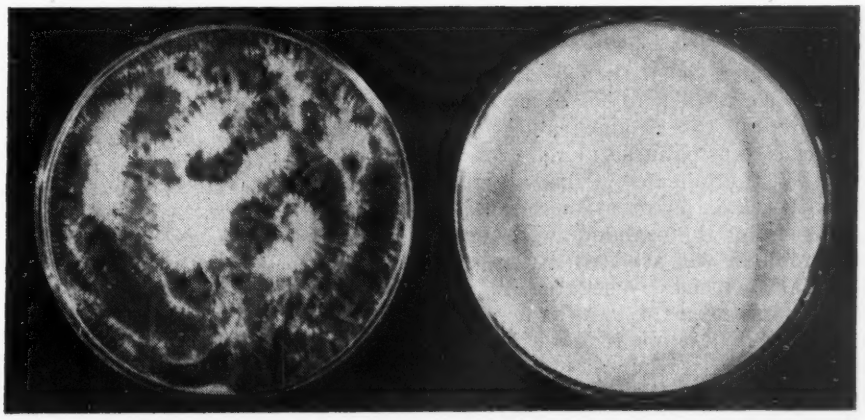

FIG. 6. Limburger cheese spread after 6 days. Left, control. Right, sample treated with 0.10 percent ethyl vanillate.

The saccharimeter utilizes the rotation of a polarized light beam to measure the percentage of sugar in food products.

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Preserving Product Quality With New Ingredients

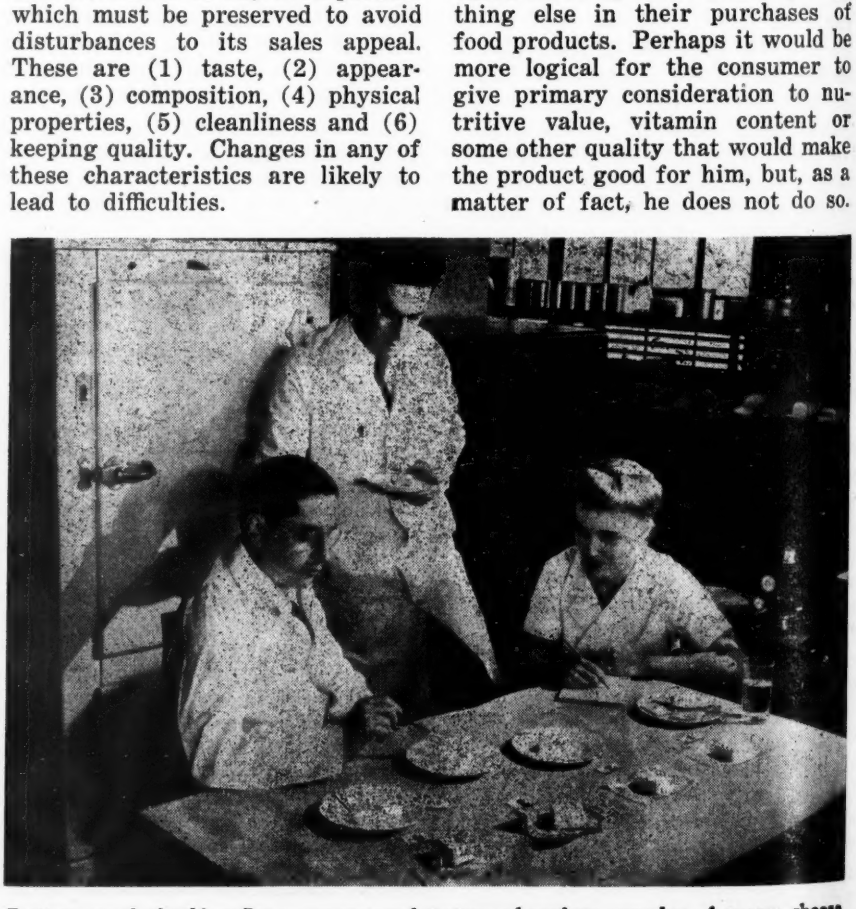
HOW to preserve the well-known and established characteristics of their products when different ingredients must be used is a problem that has faced many a food manufacturer. In some instances changes of ingredients have been made without causing any appreciable change in the finished product. In other instances, where the substitute materials had peculiar characteristics which might alter the finished product, suitable steps have been taken to guard against this result.

The difference between one ingredient and another may be so small as to pass unnoticed under ordinary conditions and yet be enough to cause trouble when introduced into a food processing procedure. The only reliable safeguard begins with careful analysis of both the new and the old ingredients. Those findings must then be interpreted with respect to the other ingredients of the product and the nature of the manufacturing process. By this means it has been found possible, in many instances, to determine beforehand whether any problems will arise when a new material is used. Where such a problem has been foreseen, it usually has been possible to solve it in advance by the introduction of some other material to neutralize an undesired characteristic, or to fortify the mixture in some respect in which it would be lacking.

Important Six

Generally speaking, there are six characteristics of any food product which must be preserved to avoid disturbances to its sales appeal. These are (1) taste, (2) appearance, (3) composition, (4) physical properties, (5) cleanliness and (6) keeping quality. Changes in any of these characteristics are likely to lead to difficulties.

In many ways, the most important of these is taste. Experience has shown that people are influenced more by taste than by anything else in their purchases of food products. Perhaps it would be more logical for the consumer to give primary consideration to nutritive value, vitamin content or some other quality that would make the product good for him, but, as a matter of fact, he does not do so.



Testing panel checking flavor, aroma and texture of various samples of cream cheese made by different procedures. Crackers and water are to neutralize taste after each sampling.

Scientific analysis of raw materials points way to maintaining original characteristics of established food products when conditions require that new ingredients be employed

The lipeometer fat tester is a direct reading instrument which makes possible the rapid determination of the oil or fat content of seeds, meats, meals, press or expeller cakes and hulls.

If he likes the taste of a particular product, he buys it. If the taste changes in a way he does not like, he stops buying it.

The Candy Case

Trifles often have a marked effect on the taste of a food product. Recently a manufacturer of a chocolate-covered candy was deluged with complaints that his product had developed an offensive taste. No change had been made in the process of manufacture, and the factory management was at a loss to understand what had happened. To locate the source of the trouble, it was decided to have a chemical and biological analysis made of the raw materials and the finished product, as well as a systematic study of the manufacturing process.

This analysis disclosed that the objectionable taste was the result of the development of an almost imperceptible amount of mold inside of the candy bar. The next problem was to find out why mold had suddenly begun to develop inside of a confection that had never before been troubled in this way. Going back to the ingredients used in making the product, it was found that one of the ingredients was being obtained from a new source of supply. This material was supposed to be the same as that formerly used, but analysis showed that it had a slightly higher moisture content.

Here, then, was the source of the trouble. The presence of this extra moisture was no reflection on the quality of the ingredient—which was, in fact, a high-grade product—but it was just enough to produce an undesirable result in the process used by this particular manufacturer. Once the source of the trouble was discovered, the use of a propionate mold inhibitor in the mixture served to eliminate it entirely.

Looks, Texture, Color

Appearance of a food product is almost as important as taste from the sales angle. Nobody likes to eat food that is unattractive in appearance. Take jelly, for example. A jelly that is too thin may have the same food values as one that is firm, but it certainly is not as attractive in appearance. Similarly, the color and texture of the product are important. In the process of making maraschino cherries, the fruit is bleached to a pure white form and then artificially colored red. It would taste the same if eaten in its pure white form, but the retailer would have a hard job to sell it that way.

When a food manufacturer finds it necessary to change one or more ingredients of an established product, he often runs into serious color and texture changes. Suppose, for example, he has to substitute molasses sirup in place of cane sugar sirup. Molasses may produce an entirely acceptable product from the standpoint of taste and nutritive value, but cause an undesirable change in color. Great care must be exercised in the selection of means to correct this condition. Some quick and easy means such as the use of an absorbent filter-aid may produce the desired result insofar as color is concerned, but may at the same time alter the taste or other essential characteristic. The time to discover whether or not anything of this kind will occur is before production starts.

Composition—the nutritive adequacy of the product—involves proteins, available carbohydrates, fats, essential oils, fiber, acids, bases, salts and vitamin content, to mention but a few. Generally, food standards are based not on caloric, vitamin or mineral content, but on the presence of certain definite compounds, or groups of compounds. Vinegar must have 4 percent acetic acid. Cream must have 20 percent butter fat, jellies 65 percent sugar, and so on. Every food manufacturer should know the composition of a substitute ingredient and how it will affect the composition of his finished product, particularly if this product must conform to a legal standard.

Bolstering Quality

There is usually no reason why a substitution of ingredients cannot be made successfully, but the new ingredients, while similar, may not be identical with the old, and careful study is required to determine the effect that their use will have on the finished product. It may be found necessary to fortify the product in some respects to counterbalance the changes in the characteristics of the ingredients when such new materials are used. For example, if the milk content of a bread formula were to be reduced from 6 percent to 3 percent, it would be necessary to add an appropriate amount of riboflavin enrichment. If the milk content were to be reduced further, or eliminated entirely, larger amounts of riboflavin enrichment would have to be added.

Another aspect of composition is the fact that the manufacturer must be prepared at all times to substantiate claims made on labels and in advertising. His product must contain the things he says it does, and must be free from things

that should not be in it. On this point, the food and drug regulations are particularly insistent—more so in most instances than the actual purchasers.

Some time ago, a large shipment of olive oil imported to this country was held up for fear that it had been adulterated with tea seed oil, which, being considerably cheaper than olive oil, has not infrequently been used as an adulterant. Because of the close similarity of these two oils in physical and chemical composition, it is not easy to distinguish between them. The importer, therefore, arranged for special tests to be made by a research laboratory whose scientists were specialists on fats and oils and their adulterants. They had developed a method whereby as little as 5 percent tea seed oil could be detected. Application of their method indicated that there was no tea seed oil at all in the olive oil in question, and the shipment was released for import.

Packaging Troubles

Practical questions often have arisen in regard to physical properties where new ingredients have been used in the making of a food product. Taste, appearance and composition may remain unchanged but a variation occur in some such characteristic as density. This can create a very troublesome problem with a packaged food product. If the change of ingredients produces even a small increase in bulk in proportion to weight, the standard package may be unable to contain the stated weight of product. If the change of ingredients produces a decrease in bulk in proportion to weight, the package may not be full. Slack-filled containers are considered deceptive under the Food, Drug and Cosmetic Act as well as under many state laws.

In such a situation, the manufacturer has a choice between two alternatives. He can change his container, which is an expensive process, or he can modify the manufacturing procedure so that the finished product will have the same density despite the change of ingredients. Since most production-minded people can think of more ways of not changing a process than they can think of ways of modifying it, the advice of food technologists, experienced in the field but not too familiar with processing troubles, usually will prove very valuable.

Cleanliness in a food product involves more than can be seen by casual examination. Some materials—such as cornmeal, cocoa beans, dried mushrooms and nuts—sometimes contain minute insect fragments or foreign material that can be detected only by careful separation, inspection, and microscopic examination. A product so contaminated must not be used.

Keeping Quality

Keeping quality is another important characteristic which requires watching when a change of ingredients is made. Some time ago a manufacturer of cheese inaugurated the use of a biological stabilizer which, when added to cheese, would greatly prolong shelf life. It had been established that this stabilizer would not be harmful to the consumer. Tests had been made, under laboratory controlled conditions, of the length of time that cheese treated with this ingredient would keep, and what the effect would be on flavor.

All tests indicated the desirability of using the new ingredient, but the manufacturer wanted to go a step further. It was decided, therefore, to make exhaustive tests of open-market samples to determine how the treated product reacted in comparison with untreated cheese under normal marketing hazards. These tests confirmed the earlier conclusions and indicated that dealers' spoilage losses would be greatly reduced.

Thus the manufacturer was able to proceed with the use of the biological stabilizer secure in the knowledge that he had made a real improvement in his product.

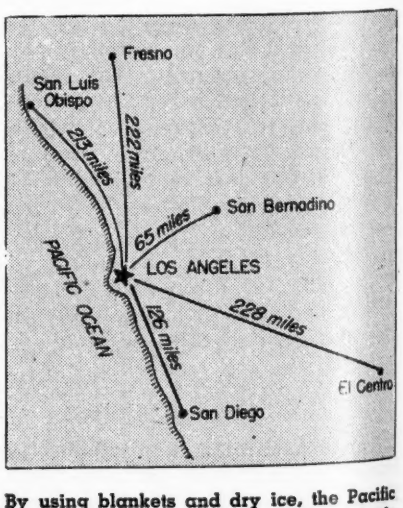
No other type of manufacturer is obliged to meet more exacting requirements than is the food manufacturer. Constant testing is highly important, even in normal times when the supply of ingredients is stable. Only by this means can the manufacturer be sure that his product lives up to its established reputation.

Flexible Cooling For Part Loads

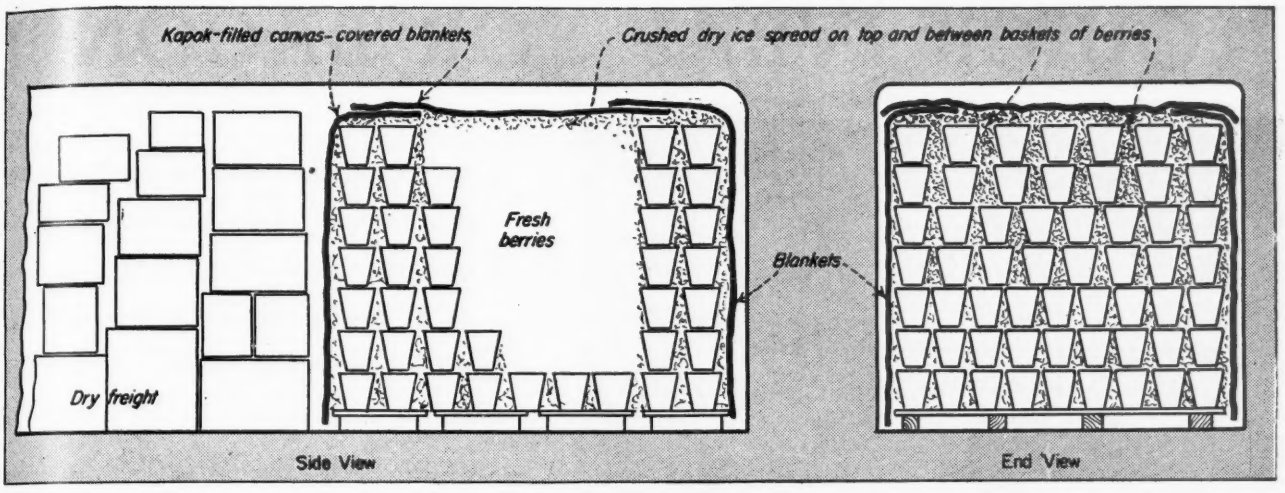
Less-than-full-load quantities of perishables, from a carton up, can be protected in transit by blankets and dry ice. Such loads can be carried with dry freight

KAPOK-FILLED blankets for insulation and crushed dry ice scattered over and through the load for refrigeration make possible the shipment of part loads of perishable foods, over long distances, along with dry freight. This arrangement can be employed when full loads of the food products, such as would justify the use of refrigerated vehicles, are not available.

By this means the Pacific Freight Lines Express, Los Angeles, handle part loads of perishables on routes radiating from that city. Points as far distant as El Centro, 228 miles from Los Angeles, Fresno, 222 miles, San Luis Obispo, 213 miles, San Diego, 126 miles, and San Bernardino, 65 miles, are covered. The perishables thus carried include frozen berries of all kinds, frozen eggs, frozen meats, butter and other food products that are not harmed by freezing.



By using blankets and dry ice, the Pacific Freight Lines has been carrying part loads of perishables regularly over this route.



Cross sections of a trailer carrying both perishable and dry loads. Arrangement of baskets and blankets illustrates the method that best protects the separate loads in transit. Removable wooden racks keep the perishables off the body floor and permit circulation of cold air under the load. The amount of dry ice required for a specific load varies and can be regulated as experience dictates.

Two different methods of using the blankets and dry ice are employed, depending upon the size of the perishables. If one small shipment is involved, such as a 30-lb. carton of yeast, the carton is entirely wrapped in a blanket, along with a small amount of dry ice. Not over 5 or 10 lb. of dry ice need be used, depending upon the distance. This and the yeast carton is entirely enclosed in the blanket and the resulting package loaded in the vehicle body, along with ordinary dry freight. Care must be taken in stacking the package containing the dry ice. Otherwise, the blanket may work loose and bring the dry ice into direct contact with other commodities in the load.

When the part load consists of one or several tons of perishables, a different method of protecting the load is used. For example, if 5 tons of frozen berries were to be moved, they would be loaded in the front end of the truck or trailer body. First of all, the baskets are placed on sectional racks on the floor of the body to provide a free circulation of cold air under the load. Then from 100 to 150 lb. of crushed dry ice scattered over the top of the berries, and finally the entire load is covered with the kapok-filled blankets. These blankets are 8 by 10 ft. long and 4 in. thick. The covering is a light canvas with the kapok stitched in place so that it cannot shift.

As many blankets as necessary are used to enclose the load. They cover the top of the load and are lapped over to extend down to the floor, on the front, rear and sides of the load.

There is no rule as to the amount of dry ice needed on a particular size of shipment or length of haul. The amount of dry ice required depends upon the outside temperature, air tightness of the body in which the perishables are carried, the temperature required for the safe transportation of the particular commodity being carried, and the distance it must be transported.

How Much Dry Ice

The first time a given shipment is carried over a given route, ample dry ice should be supplied to provide adequate protection for the number of hours of exposure. On subsequent shipments, the amount of refrigerant can be reduced as experience dictates. The same rules apply to the amount used on individual carton shipments. For example, a crate of meat, packed with dry ice, will keep from 30 to 36 hours without reicing.

In handling the dry ice placed on the perishable loads, the loaders use leather gloves to protect their hands. Direct contact with this refrigerant causes severe skin burns.

On individual carton shipments, the Pacific Lines tariff requires that the shipper provide his own refrigerant. This is usually done by the shipper inserting a small slab of dry ice entirely within the shipping container or the enveloping blanket. Except in the case of bulk loads of several tons, the enclosed dry ice inside the container has proven more satisfactory than loose ice piled on the containers after they are loaded.

The floor racks are made of 1 by 2 in. rough lumber and are laid flat. The boards are spaced about 2 in. apart and are nailed to sleepers placed at right angles. The sleepers are 1 in. high, 2 in. wide and 2 ft. long. The racks are 2 in. thick, 2 ft. wide and truck width in length. They provide a 1-in. air space above the floor.

The racks were originally designed for use with wet ice protecting a perishable shipment. Their purpose then was to keep the cargo up off the floor and permit the water from the melted ice to drain through holes in the body floor. But when dry ice was substituted, the same racks provided a clear space under the load for circulation of cold air. Although the blankets originally used were filled with ordinary kapok, Dry Zero may be employed for the insulating material.

No attempt has been made to compare the cost of refrigeration by means of blankets and dry ice and by a conventional refrigerated vehicle body, since the former method was—and is still—used only for part loads except in cases of emergency. Likewise, no attempt has been made to record inside body temperatures when the blankets and dry ice were used. However, the cost of refrigeration by the blankets and dry ice is not considered excessive when the blankets can be kept in constant use.

For the factual data contained in this article, FOOD INDUSTRIES is indebted to Ellis T. Longenecker, formerly connected with the Pacific Freight Lines and now Federal manager of Motor Carrier Transportation Systems and Properties, with headquarters in Minneapolis, and George E. Boyce, present dock superintendent for the Pacific Freight Lines. Both men agree that this is not a substitute for a regular insulated and refrigerated vehicle body for carrying full loads of perishable foods.

QUICK WRAP FOR BACON

New package is designed for easy packing without sacrifice of sales appeal. Mechanical design of the wrapper cuts packing-line time for sliced bacon and for sausage. Opacity protects product against light.

By GRACE HIGHTOWER
Assistant Editor

HAND FILLING and hand wrapping are big factors in food-plant economy. Anything that can be done to speed hand packing —anything that may make packaging-line labor more efficient—deserves serious consideration.

One avenue of improvement is design of the package so that it is inherently easy to handle. An example of that is a package for sliced bacon recently offered to the industry.* This wrapper has been tried out by a number of large packers, both in plant and in test markets, with favorable results. Acceptance at present, like that of so many other things, hinges on supplies.

Fewer Motions

Made of waxed sulphite stock, with a permanently adhering heavier waxed stiffening strip through the middle, the wrapper can be taken from a stack and laid in place for filling with one movement. The transparent cellulose sheets that have been widely used for bacon must be interleaved with paper to prevent difficulty with static and to make handling easier. Therefore, the placing of the cellophane involves two operations—removal of the wrapper and its accompanying paper from the stack to the wrapping position, and removal of the protective sheet.

The stiffness of the waxed wrapper also reduces materially the series of movements required after the bacon slices have been put into place. (There is no difference in the handling of the bacon.)

The finished package is square ended, neat and attractive, with sufficient firmness to stack well and to handle without bending.

Since the main portion of the wrapper is firm, with scoring for all folds, one motion with each hand turns in the ends, a second puts the small flap in place, and a third flips over the whole package, completing the wrapping. There is none of the pressing down and tucking in that is required with a flexible wrapping. Three smooth movements, that with practice become practically one continuous motion, do the trick. The waxed surfaces adhere sufficiently to the bacon so that the package remains closed under the weight of the contents.

Handling of the package from then on is facilitated by the fact that the units are uniform in shape and size. But the extent of the improvement can be determined only by extended tests, which so far have not been practicable due to supply uncertainties.

Some time studies have been made, and the manufacturer claims at least a 25 percent reduction in wrapping time. This seems conservative.

Easy to Make

The wrapper is simple to manufacture. Two rolls of waxed sulphite of suitable width (the stiffer one being narrower than the other) are coated with hot wax, passed through rolls to cause them to adhere together, scored, and the combined web cut to length for the individual packages. Because of the reinforcing effect of the wax between the two sheets, the total thickness of the paper required is less than that of the usual chipboard carton material, the heavier layer being 0.009 in. thick and the combined web 0.012 in., as against a minimum of 0.016 in. for chipboard. Sulphite sheets of this weight can be made on the Fourdrinier machine. That fact made possible continued development of the package during the war period, when all equipment that would make the heavier weight stocks was overtaxed.

In spite of the ease of manufacture, however, the waxed wrapper is more expensive than the single transparent sheet. If it is to be generally adopted, the difference must be made up through reduced labor costs, through better protection for the product and through merchandising advantages.

Protection Enhanced

There can be little doubt of the protective value. All pork products are adversely affected by light, especially in flavor and color, and cured meats are particularly sensitive in this respect. Therefore, the opacity is a strong point in favor of the waxed wrapper.

Also, air is excluded far better than with the flexible sheet. The combination waxed package is not sealed, but by wrapping before the bacon is chilled and by utilizing the weight of the package itself to hold

*Sold under the trade name of "Mullinix" by Western Waxed Paper Co., Division of Crown Zellerback Corp., Los Angeles, Calif. Made under U. S. Patent 2,335,019.

down the outer flap during chilling, an effective barrier against free passage of air is produced.

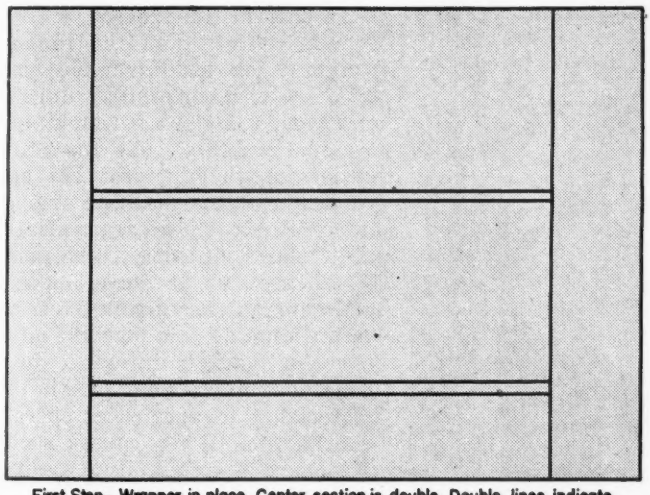
The most common attitude among packers is that they would prefer to sell sliced bacon in opaque packages, but that the transparent package has been necessary because bacon is one thing that every woman insists on seeing before she buys. Yet bacon has little beauty in itself, and even an expert cannot tell about the cure just by looking. Packers further assert that most women carefully pick out the bacon with the least desirable distribution of fat and lean.

The merchandising problem then becomes a question of whether most women will give up the privilege of looking at the bacon and put their trust in a brand name. The manufacturers think that they will, provided that the brand name is always accompanied by high quality.

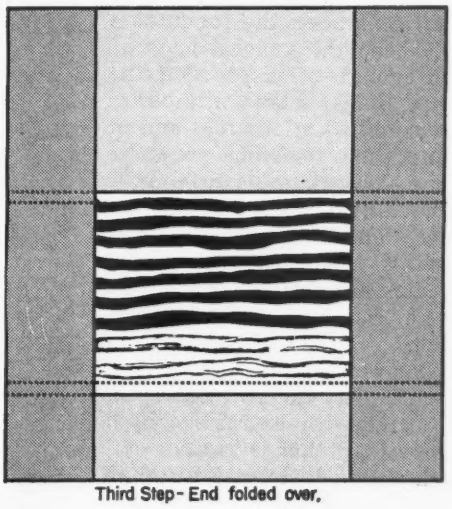
The waxed wrapper lends itself admirably to printing. Filled packages stack well in a refrigerated case, making a good display. The construction that makes packaging easy also makes the package a good one to handle in the home. In the refrigerator it protects the bacon slices against bending and tearing. It can be held in one hand while slices are removed one by one for cooking. And it can be closed again when part of the contents are used.

The arguments that apply to bacon wrapping hold with still more force in the case of link sausage, for which the same type of package is adapted. Link sausage heretofore has been wrapped in parchment and placed in a carton. So for sausage, the combined wax wrapper is a cheaper material. And it shows a greater gain in packing speed. And here, too, the waxed wrap affords much better protection against oxidation.

There is one possible disadvantage that can nullify the labor saving value. Waxed blanks admittedly have a tendency to block, or stick, together. Research on the waxes has reduced this, but it is still a factor to be considered. Whether any necessary care in storage and handling, to prevent blocking, is more bothersome than that required with alternative materials will depend on conditions in each plant.

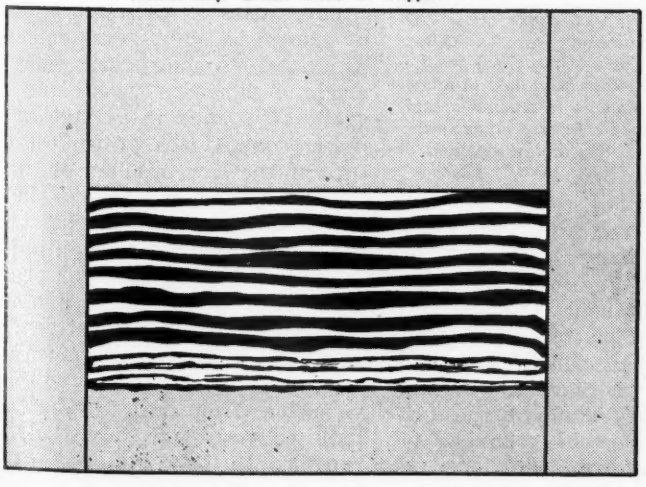


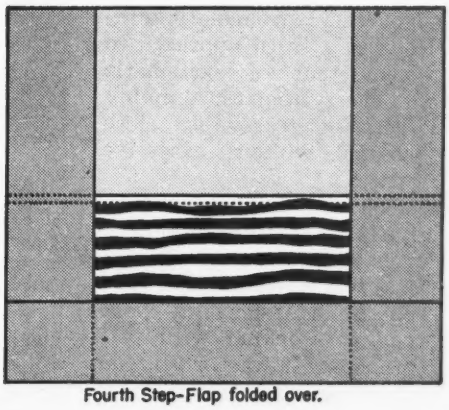
First Step- Wrapper in place. Center section is double. Double lines indicate scoring for folding.



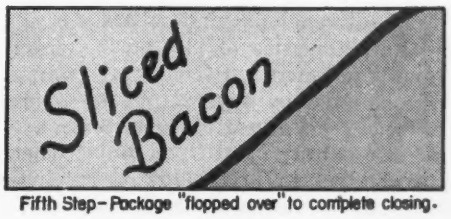
Third Step- End folded over.

Second Step-Bacon slices on wrapper.





Fourth Step-Flap folded over.



Fifth Step-Package "flopped over" to complete closing.

Sliced bacon is wrapped quickly, in five steps, with reinforced waxed wrapper.

Systematic Sampling Pays In Controlling Filling Weights

Explained in nonstatistical language is a procedure that should be considered carefully whenever quality or cost must be controlled. Its actual use in can-filling weight control is described

By H. P. GOODE, School of Engineering, Stanford University, Calif., and GEORGE I. DUNDAS, Sutter Packing Co., Palo Alto, Calif.

EVERY food packer is confronted with the problem of container-fill control on the production line. To keep the general level of fill high enough to insure that the occasional lightly filled container is above a specified minimum—and at the same time to avoid excessive costs due to continued overfilling—calls for careful control of the filling operation. So far, no method or machine has been devised for large-scale operation that will weigh or measure without some variation.

One answer is to check-weigh every container, thereby achieving good control with extremely high labor costs. Another is to take random samples, which may or may not be representative. Statistical analysis of the variations that occur, and of their probable significance, leads to a third approach to the problem—that of systematic sampling. The systematic sampling method permits reasonably close weight control without excessive labor costs.

There has been developed in the manufacturing industries a statistical device, the "control chart," which has found widespread and successful application both here and abroad in working with this type of problem. It was originated a number of years ago by Dr. Walter A. Shewhart of the Bell Telephone Laboratories for use in the control of dimensions and other quality characteristics of electrical parts and equipment. Recently it has been adopted by several West Coast canners as a useful tool in the control of filling operations and other procedures in processing.

As applied in the canning plant, a small group of filled and sealed cans are taken from each line at

With controlled sampling on the coffee packing line the results of the check-weighing can be interpreted immediately in terms of necessary adjustments to machines and operating procedures. At the same time, unnecessary adjustments can be avoided.

specified intervals. These are weighed, and from the observed weights the average weight and the range between highest and lowest weight are obtained. Average and range are then plotted on a chart from which the operator can tell immediately whether the filling operation is proceeding in the normal and expected manner or whether there are conditions requiring investigation and correction.

It will be obvious that the skill required is no greater than for the usual haphazard sampling, once the charts are set up.

To get at the reason why the average weight and the range of weights for small samples made up of several consecutive units are observed, instead of watching individual weights, calls for a brief review of the factors that cause variation in any machine or operation. First, there are variations that show up only occasionally. These are due to some important and generally assignable cause such as the slipping of a machine adjustment, a marked difference in the general composition of the raw material or inexperienced operators on the job. When causes such as these are detected, it is desirable and usually possible to take some corrective action to return the machine or operation to its former producing state.

In addition to these occasional major causes, there are always present a number of normal and minor causes of variation which it is impossible or uneconomical to eliminate. Among these may be machine vibration, small and frequent variations in voltage of the power source, lack of perfect mixture of the raw product, or, in the case of manual operations, the uneradicable human element. Each one acts so that the magnitude of its effect on the process or product from unit to unit follows a more or less random chance pattern. The net effect of all minor chance variations normally present will be a variation from unit to unit distributed over a fairly definite range, with the majority of the weights or measurements clustering about a central value.

The control chart is simply a device to distinguish between values

that could be expected from a combination of the normal and minor variations inherent in the operation and changes due to an irregular cause that has recently entered the picture.

What the Charts Show

To judge, on the basis of a small sample, whether or not the filling process has gone "out of control," the average and range of a group of containers all taken at one time is a much more sensitive and satisfactory guide than the weight of individual units taken by themselves. The scope of this article does not permit a discussion of the statistical theory involved in that statement or in the placement of the control limits. However, there are two brief and simple manuals* that enable a person with little or no statistical training to make and use the charts. These explain all the steps of the procedure and include a small table of factors that make the establishment of control limits very easy.

Of the several types of charts that have been developed, the ones used for applications such as that considered here are those for averages and ranges. These charts, are particularly adapted to assist in the control of any process or operation whose effect on the product is measurable in terms of ounces, degrees, inches or some similar unit. Slightly different charts are available for the control of characteristics which are inspected on a "go" and "no-go" basis and for characteristics for which the number of defects in a test sample or production unit are counted to indicate quality level.

Typical charts for can-fill are shown in the illustration. For both the average weight of the sample group and the range of individual weights, the line representing the long-range expected average is plotted. Then on each side of the central line is the zone in which practically all test results will fall so long as variations result solely from the system of minor chance causes. That is, so long as actual values fall within this zone the process is in control. However, once a value falls outside of the zone, it is an almost sure sign that an assignable major cause has recently entered the picture, presumably one that should be discovered and eliminated. One of the essentials for successful application is promptness in weighing and entry, so that results are available while they represent material in process.

It should be pointed out that these limits are set entirely by the machine or operators involved and show what can be expected from normal operation. They bear no relation to any specified or desired limits. To see whether or not all units of the product will meet established specifications, a calculation must be made which will show the extreme minimum and maximum weights that can be expected for individual units.

Because the system has been installed in several canneries and procedure there is established, the following discussion will be limited to use for can-filling weights. The method itself has no such limitation, as is readily apparent.

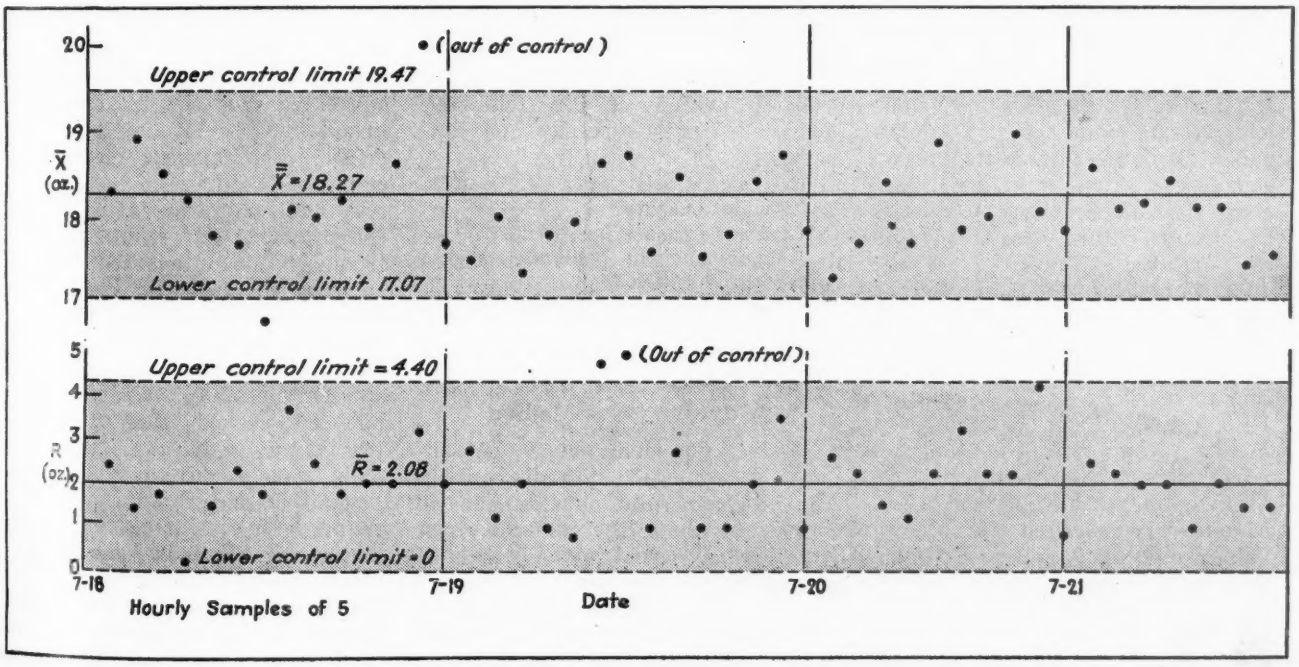
Application to Can Fill

In the cannery, working limits usually are determined by trial packs. The experimental work necessary to set proper tolerances must be given careful consideration. Many variables enter into the picture. For heat-processed products, these include size of can or jar, time of cook, temperature of cook and type of cooker used. In general, the object is to determine what filling weights give the correct drained weight. This is important for three reasons. First, government standards have set a minimum drained weight on most products. Second, a canner does not want to overfill a can or jar. And third, on vegetables an overfill might mean understerilization and consequent spoilage.

Setting up the charts necessitates considerable extra work the first season, but unless all procedures are radically changed, the data then apply for a number of years.

The general procedure in making

*"Guide for Quality Control and Control Chart Method of Analyzing Data," American War Standard Z1.1 and Z1.2—1941. and "Control Chart Method for Controlling Quality During Production," American War Standard Z1.3 — 1942. (Both issued by the American Standards Association, 29 W. 39th St., New York, N. Y. Price, 75 cents.)



This type of chart not only shows when the process is going well, but warns when trouble is developing, in time to correct it. As used in the factory, the chart is plotted on graph paper.

experimental packs is as follows:

1. Can samples to exact filling weights.
2. Use fruit or vegetables of even ripeness for each experiment, and record the condition of the product carefully.
3. Record and file time and temperature data on process used.
4. Make several packs of the same product throughout the season to cover different conditions such as texture, ripeness and sugar content.
5. Pack enough cans each time so that a representative group may be cut and inspected at one time. Twelve has been found a satisfactory number. There should be sufficient for three cuttings, one the day after packing, the second one month after packing, and the last six months after packing.
6. Process experimental samples through the same equipment as the regular product.
7. Determine and record drained weights.

When the results of these experiments are tabulated, a chart can be prepared to show what average filling weight should be used at any particular time. Due to changes in degree of ripeness of the fruit or vegetable, the results may show that it is necessary to change the actual filling-weight limits as the season progresses.

In one plant using the system, it was found that statistical control limits could be established at the start of the season by determining average and range for 20 samples, omitting those from the first day.

The number of units in each sample group and the frequency of sampling are determined during the experimental work necessary to set up the charts. For mathematical reasons explained in the manuals, the number of units in each sample group will be under 10. For simplicity and accuracy, each sample group contains the same number of units.

In controlling the filling weights for peaches, it was found that sample groups of five consecutive cans taken at hourly intervals from each line gave the necessary accuracy. If all lines were running, this might mean that the inspector must take—a total of eight samples of five cans each. As soon as the samples are collected, the average and ranges are calculated. The figures are then posted on the charts, a separate one being kept, of course, for each grade and size.

When any sample indicates lack of control at the filling line by either the average or the range falling outside the control limits, the production foreman is notified and an investigation started. This is done immediately following the weighing and posting so that the contents of the cans can be investigated and so that corrective action can be taken at once. In most cases it was found that the correction of the trouble was not a matter of adjusting the machines but of educating or instructing the operators.

Each day's filling weights are reviewed the following day, together with the drained weights from that day's sample cutouts. Also, the ripeness of the fruit is watched and on the basis of these observations and a knowledge of the desired weights, the limits on the control charts are recalculated and adjusted. Adjustments are made at the line only when the charts indicate that they are required.

During the season before the chart method was used, one person on each shift had been assigned the responsibility for checking filling weights (and temperatures). This was done in a rather haphazard manner, and no orderly records were kept of any of the data taken. Upon installing the chart system, it was found that no additional help was necessary and that no special training was needed to do the sampling and care for the details of the charts. This work was done under the supervision of the Laboratory Control Department, which planned the sampling procedures, established control limits when necessary, and followed up when lack of control was shown by a chart.

In setting up an actual weight control procedure, the following questions must usually be answered:

How much will the system cost to install and operate?

Can this expense be justified?

Who, among the personnel, should operate the system?

What training is necessary for these persons?

What sampling procedure should be used?

Advantages of Method

These questions must be answered for each individual plant. But we can point out the general ways in which the control chart method may assist in the control of filling or net weights.

First, the method will assist in minimizing the change of weight from container to container by pointing out, and often assisting in locating, assignable causes of variation. These causes may then possibly be eliminated from the filling process, enabling the average weight to be kept nearer the tolerated minimum.

Second, the method may give an early indication that the operation is going out of control—often in time to prevent the packing of any units that will fall below the required limits.

Third, the charts may prevent a great deal of unnecessary and often harmful adjustments and changes to the filling machine or operation. The control limits not only indicate when to adjust or look for trouble but, equally as important in many cases, when not to adjust or hunt trouble. Variations within the control limits are to be expected, and in such cases the best thing to do is to leave the operation or operators alone.

Fourth, the charts show clearly what range of variation in indicated weights can be expected from the process as it normally operates. This information may be of a great deal of assistance in the problem of weight tolerances or determining average weight levels to meet minimum specifications.

Fifth, in some cases the method may reduce inspection costs by allowing a reduction in the number of units weighed or measured. Experience and theory have both demonstrated that it is easier to get proper quality or weight assurances by maintaining chart control with relatively few samples than by using many samples in the customary way.

Furthermore, when complete records are kept of the cause of trouble each time the process goes out of control, the information is invaluable in designing new equipment or establishing methods for employee training.

A final point in favor of these charts is that they can be easily introduced and integrated with the customary inspection procedures. A modest start can be made by a trial application at some one operation. This may be followed by other applications as experience and confidence is gained. Most of the work involved in the technic is customarily done anyway. The small amount of additional work that is required to calculate the average and range for each sample and to plot them on the charts will vastly increase the amount of information obtained. The results so far indicate that this should soon be one of the standard control technics in the food industry.

SO YOU ARE GOING INTO FREEZING?

What data should you have before entering into the production and distribution of frozen foods? You will need sound answers to a host of questions, so a check-list questionnaire is presented here as a guide. It will aid manufacturers and distributors in evaluating the problems and opportunities in this field

By C. R. HAVIGHORST, Assistant Editor, San Francisco, Calif.

How To Use The Check List

BECAUSE both large and small food manufacturers and distributors, with various kinds and numbers of executive and supervisory personnel arrangements, may wish to use this check-list, the queries are directed to a simplified type of plant management and distribution personnel, shown at the top right-hand side of the following pages. It is sufficiently flexible so that manufacturers selling through brokers, or those selling direct, may put it to use. It is also composed so that it may be used by manufacturers who control their distribution through their own wholesale and retail operations.

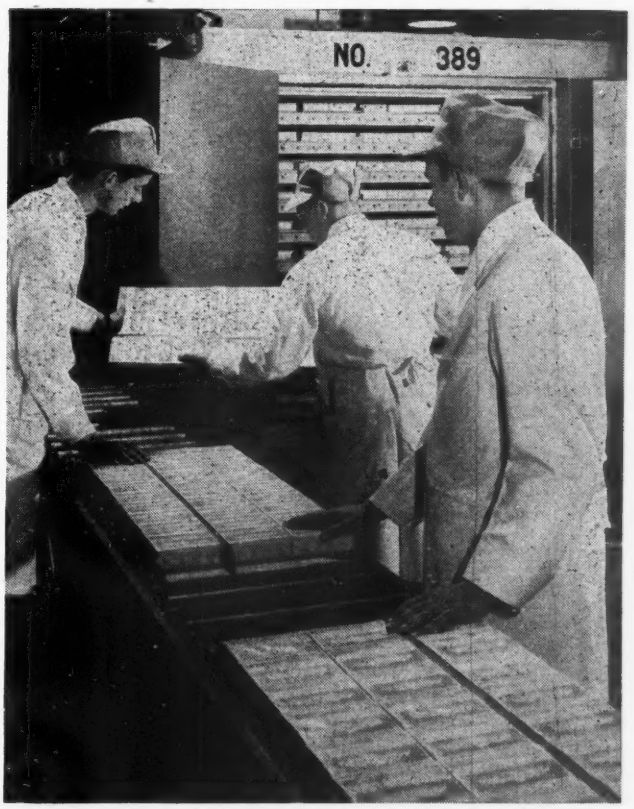
As a preliminary research tool, the check-list is planned for conference use, with all executives and supervisory personnel, or it can be directed to specific personnel for their individual attention.

For food manufacturing companies only, market researchers will use the company's connection with their brokers, wholesale outlets and retail outlets as a source of direct information necessary to complete a study of this nature.

Food manufacturing and distributing organizations (such as chain and super-market companies) will rely on information secured from their own executive personnel who operate their wholesale and retail departments. If such organizations plan to buy direct from frozen food packers, then the Broker column can be eliminated, except for purposes where brokerage commissions or services need to be studied.

These queries are of a general and preliminary nature, as it would be impossible to foresee all problems facing every kind of food manufacturer and distributor planning to enter the frozen food business. It is intended to become the basis of a fundamental research and study from which a company may then make a complete and final analysis of its potential position in the frozen food industry. Such an analysis may prevent serious difficulties later.

The *X* marks, shown in the columns at the right side of the pages, merely suggest that these department heads and distribution sales factors should be helpful in providing answers to the queries. If it is desired, these may be changed by simply relabeling the columns.



Packaged food being frozen in the multiplate freezer used by the Birds Eye-Snider Division of General Foods Corp. Processors already in the frozen food business know the answers to the questions on the accompanying check-list; newcomers must get as many of the answers as they can before they venture too far.

MANAGEMENT AND FINANCIAL APPRAISAL

Some of the problems that will confront newcomers in frozen food production and distribution

MANAGEMENT & FINANCIAL APPRAISAL—What purposes will be served by this new venture?	Executive Management	Production Executive	Plant Superintendent	Control Laboratory	Product Research	Packaging-Shipping	Purchasing (All)	Sales Executive	Sales Staff	Advertising Staff	Market Research	Brokers	Wholesale Outlets	Retail Outlets	Legal Department
Create a profitable new manufacturing ☐, distributing ☐, retail ☐ department?	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Complete present line of food products? ☐ Anticipate and fill a changing consumer demand? ☐	X	X	X		X			X	X	X	X	X	X	X	
Substitute for products declining in demand? ☐ Stimulate attention to company by new customers? ☐	X	X		X	X			X	X	X	X	X	X	X	
Develop and expand sales through sales staff? ☐ Brokers? ☐ Wholesale ☐ and retail outlets? ☐	X	X				X		X	X	X	X	X	X	X	
Can present facilities, now operated by the company, be utilized in this venture? ☐ What facilities: Food processing plants? ☐ Refrigerating plants? ☐ Transport facilities? ☐ Wholesale ☐ and retail outlets? ☐	X	X	X	X		X	X	X			X		X	X	X
What will be approximate or estimated investment required for this venture? ☐ What will it be used for: Frozen food plant? ☐ Refrigerated warehouse? ☐ Operation capital? ☐ Refrigerated trucks? ☐ Cabinets? ☐	X	X	X	X	X	X	X	X			X		X	X	X
What are best preliminary estimates of: Packer's processing costs? ☐ Profit margins? ☐ Wholesale distribution costs? ☐ Profit margins? ☐ Retail operation costs? ☐ Profit margins ☐	X	X	X		X	X	X	X			X		X	X	
Does expected sales volume show adequate profit margin? ☐	X	X	X	X	X	X	X	X		X	X		X	X	
Does prospective profit warrant risk under the most adverse circumstances anticipated? ☐	X	X	X	X	X	X	X	X		X	X		X	X	
Will this new venture be unduly burdensome on present executive and supervisory personnel? ☐	X	X	X	X	X	X	X	X		X	X	X	X	X	X
PRODUCTION & SUPPLEMENTARY SOURCE OF FROZEN FOODS (Preliminary feasibility studies)															
Which of the several processes now in use for freezing foods is most practicable? ☐ Are there others? ☐	X	X	X	X	X										
What process development is necessary? ☐ Cost? ☐ What laboratory research is necessary? ☐ Cost? ☐	X	X	X	X	X	X									
Are there any unusual production problems involved to: Obtain desired quality in product? ☐ Assure safety to public health? ☐ For efficient, economical production? ☐	X	X	X	X	X	X	X								X
Are raw materials of reasonably good quality readily available? ☐	X	X	X	X	X		X								
Are there any unusual legal or patent problems likely to be involved in these freezing processes? ☐	X	X	X	X											X
Will it be necessary to supplement company's production output with purchases from other packers? ☐	X	X	X	X	X			X			X	X			
If so: what quantity ☐, quality ☐, and kinds of products ☐ may the company expect to purchase?	X	X	X	X	X		X	X							
Will packers sell direct to the company ☐, through brokers ☐, through brokers and wholesalers? ☐	X	X		X	X	X	X	X							
Will it be necessary for company to buy such products packed under seller's label ☐ or under company's own label? ☐	X	X				X	X	X		X	X	X			
Are packer's plants in close geographical proximity to company's refrigerated warehouses ☐, retail outlets? ☐	X	X		X	X	X	X	X				X	X	X	
RAW MATERIALS PROBLEMS. Company's raw materials studies should include:															
Is plant located in region that provides a source of raw materials for popular items? ☐	X	X		X	X	X	X	X		X	X				
What raw materials are needed? ☐ Are adequate supplies of the most desirable varieties assured? ☐	X	X	X	X	X	X	X								
What is the radius, surrounding plant, from which these raw materials will be drawn? ☐	X	X	X	X	X	X	X								
During a year, how many months will plant operate when processing these popular frozen items? ☐	X	X	X	X	X	X	X								
What other raw materials, available in this region, may be substituted or used for continuous plant operation? ☐	X	X	X	X	X	X	X	X							
How will substitution affect overall production costs? ☐ What is consumer acceptance or demand for such products? ☐	X	X	X	X	X	X	X	X		X	X				
Can intra- or interstate tariffs or regulations affect delivery or costs of raw materials? ☐	X	X		X	X	X	X								
Do potential competitors control part of raw material supply, or can the company buy freely here? ☐	X	X	X			X	X								X
What transportation problems or costs might affect the cost of raw materials at the plant? ☐	X	X	X	X	X	X	X								
Any special refrigeration problems or facilities required? ☐	X	X	X	X	X	X	X								
Will early harvest be diverted to fresh wholesale markets? ☐ To retail units? ☐ Prepackaged? ☐	X	X	X	X	X	X	X	X	X		X	X	X	X	
To assure maximum recovery from raw materials, what products can be made from "grade-out" and waste material? ☐	X	X	X	X	X	X	X	X		X	X				
PLANT DESIGN, CONSTRUCTION AND LOCATION (Preliminary feasibility studies)															
DESIGN. Are any unusual or technical problems of design involved? ☐ Are consultants needed? ☐	X	X	X	X	X	X									

Will early harvest be diverted to fresh wholesale markets? ☐ To retail units? ☐ Prepackaged? ☐

To assure maximum recovery from raw materials, what products can be made from "grade-out" and waste material? ☐

PLANT DESIGN, CONSTRUCTION AND LOCATION (Preliminary feasibility studies)

DESIGN. Are any unusual or technical problems of design involved? ☐ Are consultants needed? ☐

Is entirely new frozen food plant necessary? ☐ Is new refrigerated warehouse necessary? ☐

CONSTRUCTION. Are any unusual or difficult construction problems involved? ☐ Are engineers needed? ☐

What other new buildings or services will be necessary? ☐

What will completion of detailed plans and specifications cost? ☐

What will be the cost of the new buildings? ☐ What will be the cost of fully equipped new plant? ☐

LOCATION DETERMINANTS: Proximity to raw-materials supply? ☐ Labor available? ☐

All necessary processing facilities available? ☐ Refrigerated warehouses nearby? ☐ Transportation facilities? ☐

Proximity to markets or wholesale-retail outlets? ☐ Near supplementary packers to facilitate combined rail-truck shipments? ☐

PRODUCTION & OPERATION PROBLEMS

What equipment will be required: Preparation? ☐ Freezing? ☐ Packaging? ☐ Handling? ☐ Warehousing? ☐

Can present operating executives operate new venture or will there be a requirement for new personnel, e.g.: executives ☐, food technologists ☐, plant or field supervisory personnel ☐, other technicians? ☐

How many additional employees will be needed of each class? ☐

Are adequate labor reserves avoidable at plant? ☐ Can additional labor be obtained if found necessary? ☐

What is the effect of local wage rates on production costs? ☐

Are estimates of capacity production of the plant reasonable? ☐

Will plant be sufficiently flexible for adjustment to unexpected heavy demands? ☐ For future expansion? ☐

RESEARCH & DEVELOPMENT

Is process flow diagram for most efficient and economical production line established? ☐ Is it available? ☐

What experimental laboratory research is necessary to: Determine yields? ☐ Improve processes? ☐ Refine products? ☐ Develop new products? ☐ Improve packaging? ☐ Costs? ☐

Is standard unit machinery for plant available? ☐ Can it be readily and quickly obtained? ☐

Are designs available for new or modified equipment that must be built by the company? ☐

Any unusual depreciation or obsolescence factors anticipated? ☐

PACKAGING, STORAGE & SHIPPING PROBLEMS

What is average cost for packaging and casing? ☐ Are packages standardized? ☐

Have legal labels been devised? ☐ Brand name registered and protected? ☐

Can proposed packages — in cases — be shipped legally and safely to all points by all types of transportation? ☐

What protective wraps and package sizes are imposed by: Size and shape of refrigerated cabinets? ☐

Action of refrigeration on foods? ☐ Strength-weight characteristics? ☐ Sizes, weights, shapes for consumers? ☐

What precautions are necessary for refrigerated wholesale storage ☐, for retail refrigerated cabinet storage? ☐

What is cost per pound per month for refrigerated storage? ☐ Is this cost reflected in selling price? ☐

Are special mechanical handling or loading facilities needed? ☐ Is this equipment available now? ☐

What is most efficient, safe and economical means of shipping: Rail? ☐ Truck? ☐ Ship? ☐

Are packaging machines and devices available now? ☐

LEGAL AND PATENT PROBLEMS

Do trade or corporation agreements interfere with the proposed venture? ☐

Do any local, state or national laws preclude proposed designs or operating plans? ☐

Is the sale of all products unrestricted by law or trade agreements in all proposed markets? ☐

Have all label and marketing laws been considered in all proposed markets? ☐

If any chemical preservatives are to be used in the process, are they approved by F&DA? ☐

What are F&DA and USDA regulations pertaining to this entire manufacturing process? ☐

What other public safety precautions are needed in processing, transportation, storage of products? ☐

Are there any new patents on food processes that could be obtained by the company? ☐

Are there any new labor contracts or agreements to be considered? ☐

MARKETING

Sales development, organization and market research

	Executive Management	Production Executive	Plant Superintendent	Control Laboratory	Product Research	Packaging-Shipping	Purchasing (All)	Sales Executive	Sales Staff	Advertising Staff	Market Research	Brokers	Wholesale Outlets	Retail Outlets	Legal Department
MANAGEMENT AND FINANCIAL APPRAISAL															
Will any agreements made with other packers (for purchase of supplemental supplies) restrict market sizes? ☐	X	X				X	X	X		X	X				X
Do any agreements limit sales or advertising effort? ☐	X	X						X		X	X				X
Have all refrigerated transportation and storage problems and costs been considered? ☐	X	X		X	X	X		X			X				X
Are all claims to royalties or other indemnities provided for? ☐	X	X	X	X	X	X		X			X				X
Has legal department made adequate study of: Employee compensation? ☐ Possible damage suits against manufacturer or distributor? ☐ Labor and sanitary laws? ☐	X	X	X	X	X	X		X			X				X
To what extent do any or all of these affect: Cost of manufacture? ☐ Distribution? ☐ Marketing? ☐	X	X	X			X		X		X	X	X	X	X	X
DISTRIBUTION PROBLEMS															
What is most efficient and economical means of shipping from plant via: ☐ Rail? ☐ Truck? ☐ Boat?	X	X		X	X	X									
What temperatures, for each product, must be maintained for safe shipment? ☐	X	X		X	X	X									
Is freezing storage available in all company's selected markets? ☐ Cost per pound per month? ☐	X	X				X		X			X				
Before frozen products reach ultimate user or consumer, who is responsible for freezing storage costs? ☐	X	X				X					X				
Are brokers, specializing in frozen food sales, more desirable than general foods brokers? ☐	X	X						X			X	X			
What is range of brokerage (commissions) paid for this service? ☐	X							X			X	X			
Is it more desirable to sell direct, through packer's own sales force, than through brokers? ☐	X							X	X		X	X			
What type of wholesale distribution organization is most efficient? ☐	X							X			X		X		
What services should a wholesale distributor provide for a packer? ☐	X							X			X		X		
PRELIMINARY MARKET APPRAISAL															
What classes of buyers will become customers for company's frozen food products:	X							X	X	X	X	X	X	X	
Re-manufacturers: Preservers? ☐ Ice cream manufacturers? ☐ Beverage bottlers? ☐ Confectioners? ☐	X					X		X	X	X	X	X	X	X	
Wholesale frozen food distributors: distributing to retail and institutonal buyers only? ☐ All buyers? ☐	X					X		X	X	X	X	X	X	X	
Frozen foods locker plants? ☐	X					X		X	X	X	X	X	X	X	
Institutional buyers: Cafes, restaurants, hotels, clubs, hospitals and other institutions? ☐	X					X		X	X	X	X	X	X	X	
Retail outlets: Independent and chain or super-market organizations? ☐	X					X		X	X	X	X	X	X	X	
If these five buyers comprise the entire market, what percentage does each take in relation to total packer's sales? ☐	X					X		X	X	X	X	X	X	X	
What grade and quality will each class of buyer prefer? ☐ What kind, size, shape, weight of package for each grade and quality? ☐	X	X	X	X	X	X		X	X	X	X	X	X	X	
From what sources are these buyers securing frozen foods now? ☐	X					X		X		X	X	X	X	X	
What relative importance do these buyers give to: Profit margins? ☐ Price factors? ☐ Quantity buying discounts? ☐	X	X						X			X	X	X	X	
Quality of products? ☐ Size, weight, shape and moisture-vapor proofness of packages? ☐	X	X	X	X	X	X		X			X	X	X	X	
Preference to known brands? ☐ Preference to brands having advertising and merchandising programs? ☐	X							X		X	X	X	X	X	
Are the best frozen food markets localized in certain geographical regions? ☐ Or are they widely distributed? ☐	X							X		X	X	X	X	X	
What market research is planned? ☐	X							X		X	X				
PRELIMINARY DETAILED CUSTOMER STUDIES (For preliminary research in each market)															
RE-MANUFACTURERS: What kinds of re-manufacturers comprise each market selected? ☐ Number in each market? ☐	X							X		X	X	X	X	X	

Are the best frozen food markets localized in certain geographical regions? ☐ Or are they widely distributed? ☐ .....
What market research is planned? ☐ .....

PRELIMINARY DETAILED CUSTOMER STUDIES (For preliminary research in each market)

RE-MANUFACTURERS: What kinds of re-manufacturers comprise each market selected? ☐ Number in each market? ☐
Are these customers sold direct? ☐ By company's own sales staff? ☐ Through brokers? ☐ Wholesale distributors? ☐ .....
What advertising media is most effective in reaching these customers? ☐ .....
What specific frozen products will these customers buy? ☐ Are they car-lot or l.c.l. buyers? ☐ .....
What grade and quality will they demand? ☐ What type of package? ☐ .....

INSTITUTIONAL: What kinds of institutional customers comprise each market? ☐ Number in each market? ☐ .....
Are these customers sold direct? ☐ By company's own sales staff? ☐ Through brokers? ☐ Wholesale distributors? .....
What specific frozen products will these customers buy? ☐ In what quantities? ☐ What grade and what kind of package? ☐
What percentage of all potential institutional costumers now have storage cabinets? ☐ How many will buy them? ☐ .....
What advertising media is most effective in reaching these customers? ☐ Are specialty salesmen necessary? ☐ .....

LOCKER PLANT: What is the number of locker plants in each market? ☐ .....
What number of these will buy commercially packed frozen foods? ☐ What specific frozen products? ☐ .....
In what quantities? ☐ What grade and quality? ☐ What size and kind of packages? ☐ .....
Are these customers sold direct? ☐ By company's own sales staff? ☐ Through brokers? ☐ Wholesale distributors? ☐ .....
If sales are made by other than wholesale distributors, how is shipment of frozen products made? ☐ .....
What advertising media is most effective in reaching these customers? ☐ Are specialty salesmen necessary? ☐ .....

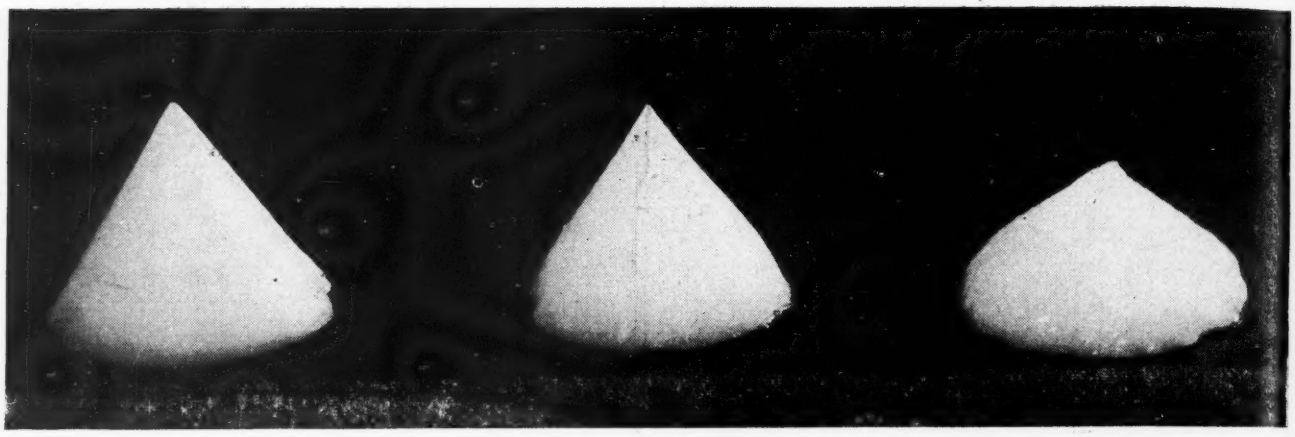
WHOLESALE DISTRIBUTORS: Are wholesale frozen food distributors operating in each market selected by company? ☐
Do wholesalers handle several packer's brands or only one, on an exclusive basis? ☐ .....
Do wholesalers handle packers sales to all five classes of buyers or to only specified buyers? ☐ .....
Are these customers sold direct? ☐ Through company's own sales staff? ☐ Through brokers? ☐ .....
What specialty sales assistance is given to wholesalers? ☐ .....
What advertising media is most effective in reaching wholesalers? ☐ .....
Do wholesalers operate their own freezing storage space, or do they lease space from public warehouses? ☐ .....

RETAIL OUTLETS: What classes of retail outlets (A, B, C) ☐ and how many of each ☐ comprise selected markets? ...
What percentage of each class now has frozen food cabinets? ☐ How many others will buy cabinets? ☐ .....
What is average monthly sale (in pounds) to each class of outlet? ☐ .....
Are these outlets sold direct? ☐ By company's own sales force? ☐ Through wholesale distributors? ☐ .....
How will company sell to cooperative retail organizations? ☐ How to chain and super-market organizations? ☐ .....
What advertising media and merchandising effort is most effective in these outlets: Point-of-sale material? ☐ Cooperative per-case allowances? ☐ Store demonstrators? ☐ Mass displays? ☐ Newspapers? ☐ Radio? ☐ Magazines? ☐ .....
Do retail outlets handle several packers' brands or only one, on an exclusive basis? ☐ .....

CONSUMER: What is per capita consumption of all frozen food products? ☐ .....
What is per capita consumption of each kind of frozen food product? ☐ .....
What consumer classes form the best frozen foods markets? ☐ .....
What are the geographical locations of the best consumer frozen foods markets? ☐ .....
Are any of these markets in close proximity to: Company's frozen food plant? ☐ Company's established distribution facilities? ☐ Company's established sales facilities? .....
What competitive factors may be encountered in these markets? ☐ .....

SALES AND ADVERTISING (Preliminary studies)

Will company's present sales staff handle frozen foods sales? ☐ .....
Will special sales department be needed? ☐ Special brokerage facilities? ☐ Special wholesale distributors? ☐ .....
Will semi-technical men or instructors be required? ☐ .....
What effect will such an organization have on selling costs? .....
Will field market research work be done by company's present sales forces? ☐ Price of products? ☐ Packer's profit? ☐ .....
Will frozen foods department require a trained, experienced frozen food distribution-marketing executive? ☐ .....
What advertising media is most effective for frozen foods in regional markets? ☐ National markets? ☐ .....
Can present scheduled advertising space be utilized also for company's brand of frozen foods? ☐ .....
How to budget advertising costs: Fixed amount as capital charge? ☐ Arbitrary percentage of sales expectancy? ☐ Fixed amount to be charged to first year's sales? ☐ .....



AMIOCA—THE STARCH F

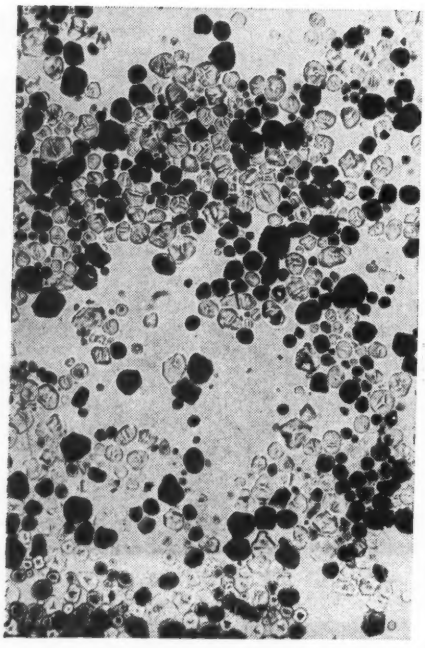


FIG. 2. Amioca and ordinary corn starch stained with iodine. (Amioca grains dark.)

With viscosity characteristics like tapioca, amioca's thick, clear pastes do not film or gel on standing

MOST of the starch produced commercially in the United States is made from corn. Smaller amounts are prepared from white potatoes, wheat, rice and sweet potatoes. Prior to the war, large quantities of root starches, chiefly tapioca and potato, were imported. The high-grade starches of these types had specific uses where the peculiar characteristics of their pastes made them desirable and they sold at a premium over ordinary cereal starches.

Waxy corn starch, known industrially as amioca,** has properties similar to the root starches. Under the impetus of the war, it was commercialized at an extremely rapid rate, the commercial milling of waxy corn beginning on a modest scale in 1943. It increased rapidly from year to year as seed and demand warranted.

In this development, plant breeders succeeded in introducing a new kind of starch into high-yielding hybrids without fundamentally changing the rest of the plant, in much the same manner that qualities like disease-resistance and stiffness of stalk were introduced. Waxy corn can be grown and handled like any other hybrid corn, except that the growing fields must be segregated. If not, pollination by ordinary corn will result and the starch will lose its desirable properties. Likewise, precautions must be taken in gathering, shipping and processing to make certain that no other corn is mixed with it. Last year, about 15,000 acres of waxy corn was grown at a 12 percent premium to farmers.

By chemical analysis, the waxy corn consistently shows a higher content of oil and of water-soluble material than does other corn. However, the oil is distributed in such a manner that it is not entirely recovered in the milling process, so that the yield of oil is no higher than from ordinary corn. Varieties low in water-soluble material are preferred for commercial wet milling. This year, 300 different waxy corn samples grown under comparable conditions are being analyzed to permit selection of those having the highest oil and protein content and the lowest water-soluble content. The best strains will be used in breeding to improve waxy hybrids.

Wet Milling

Processing has been carried out in the conventional wet milling fashion on waxy corn crops from the 1942, '43 and '44 seasons, with very satisfactory results. The wet milling process is briefly as follows:[1] Corn is steeped in a countercurrent system for approximately 48 hours, in process water containing 0.2 per cent sulphur dioxide at 128 deg. F. After steeping, the corn is screened and run through a Foos mill to crack it and free the germ. The germ is removed from the cracked corn by flotation, and the slurry, consisting of starch, fiber and protein, is further ground on a Buhr mill to permit good separation of the crude starch from the fiber by silk reels and shakers. The gluten tailings from the separation tables contain some starch which is further removed by settling this slurry to a higher concentration and then centrifuging.

*Part of a paper presented at the Gibson Island Conference of American Association for the Advancement of Science, July 18, 1944.

**Amioca is a generic term adopted by all the members of the starch industry, therefore it is printed here without the capital, to prevent any confusion with brand names.—The Editors.

FIG. 1. The extreme clarity and lack of gelling tendency of amioca pastes (1:10 with water) are shown by these cones. The cone at the left was 100 percent common corn starch. Those successively to the right contained 25, 50, 75 and 100 percent amioca.

FROM WAXY CORN

By H. H. SCHOPMEYER, Director of Research,
American Maize-Products Co., Roby, Ind.

The control analytical data for the processing of waxy and of common corn were surprisingly similar as regards the composition of the fiber, gluten, germ and oil obtained.

As for operations in the plant, it was found necessary to feed the starch and gluten mixture onto the tables a little more slowly than with regular corn because the wax seemed to separate more slowly from the gluten. Some difficulty was likewise encountered in obtaining satisfactory dried starch in the continuous dryers, and the rate was decreased to obtain the desired moisture content. Further study showed that the waxy starch seemed to come to equilibrium with a slightly higher moisture content than ordinary starch.

How Amioca Differs

The properties of amioca that make it of particular interest commercially are the thick clear paste, which has very little tendency to gel on standing, and the ease with which it can be modified by chemical treatment. The molecular constitution responsible for these properties has been of interest to the starch chemist in fundamental studies.

Potato, corn and tapioca starches consist of two fractions.[2] One, called "amylose," is a straight-chained glucose polymer which comprises about 28 percent by weight of common corn starch. The other, called "amylopectin," is a branched glucose polymer of remarkably different properties. Amioca is entirely amylopectin.[3] In the accompanying table it will be noted that the properties of amioca are very similar to those of the amylopectin fractionated from common starch, except that the amioca molecules are organized into the form of a granule.

The fact that amioca is 100 percent amylopectin at once suggests the possibility of starch which is 100 percent amylose. No such starch is known, but it would find ready acceptance. It would be expected to behave somewhat like cellulose; to have extremely high gel strength, with good film and fiber-forming qualities.

Unswollen amioca granules look very much like those of common corn starch, but the two can be differentiated readily by their color reaction with iodine—the former stain reddish-brown and the latter a deep blue. Fig. 2 shows the difference in intensity obtained by treating a 50:50 mixture of waxy corn and common starch granules with iodine.

Viscosity is one of the most important of the properties that determine the use of a starch. Consequently, a study was made of the effect of various agents on the viscosity of amioca.

Using pastes of unmodified starches, it was found that at low concentrations the hot viscosity of amioca was much higher than that of tapioca, comparing favorably with potato starch (Fig. 4). As the concentration of the pastes was increased and as the time of cooking lengthened, the viscosity of amioca became only slightly higher than that of tapioca and less than that of the potato.

FIG. 3. High-yielding hybrid corn such as this yields the waxy starch.

It is interesting that, under certain conditions, mixtures of amioca with common starch show a higher viscosity than either alone at the same concentration, as is shown in Fig. 5.

Since amioca finds use in food products which may contain fruit acids or enzymes, the effect of these agents was investigated. A series

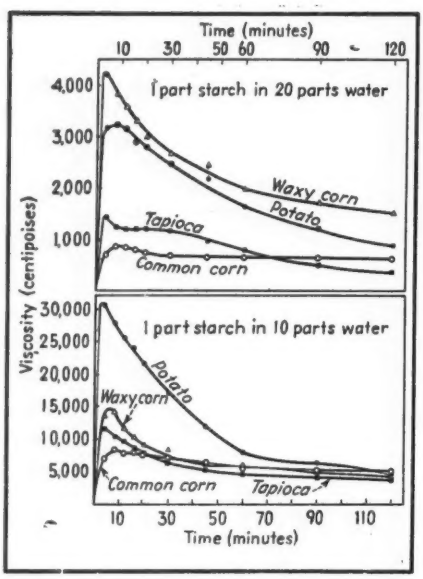


FIG. 4. At low concentrations, the hot viscosity of waxy starch is relatively close to that of potato starch but at higher concentrations and after longer cooking it is only slightly above that of tapioca.

of samples of corn starch, amioca and tapioca made up in concentration of 1:12 in water were gelatinized and adjusted to varying pH values with citric acid. The samples were allowed to stand overnight and the viscosity change noted. The behavior of amioca was similar to that of tapioca. Both showed marked decrease at pH values higher than about 5.5. They were comparatively stable in the range 3.5 to 5.0, and both thinned out very badly at pH values below 3.5, as shown in Fig. 6. Ordinary corn starch was not as sensitive to pH changes. The effect of tartaric and malic acids was similar to that of citric acid.

Liquefying enzymes such as Wallerstein 10X were found to attack amioca and tapioca at about the same rate. Common starch proved more resistant to this enzyme than amioca, as seen from Fig. 7.

The extreme clarity and lack of gelling tendency in concentrated amioca pastes has been noted repeatedly.[4,5] In the photograph, Fig. 1, it will be observed that the addition of amioca greatly retards the gelling tendency of common starch, even in high concentrations of the latter.

Uses

The clarity of amioca pastes suggests its use in certain food products such as pie filling or candies. In salad dressings it has proved very satisfactory because of the combination of high viscosity with lack of tendency to gel or form tough skins.

Where a prepasted starch is desired, in such food products as "Minute Tapioca," amioca is excellent because of its high water absorptive power and the fact that the gelatinized dried starch will hold together well. Common corn starch cannot be used since the gelatinized dried pellets become horny and will not redisperse satisfactorily in water.

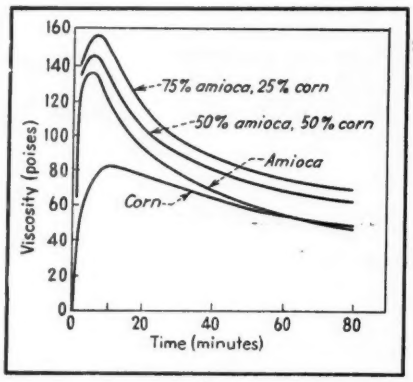


FIG. 5. Mixtures of waxy and common corn starch may show a higher viscosity than either alone.

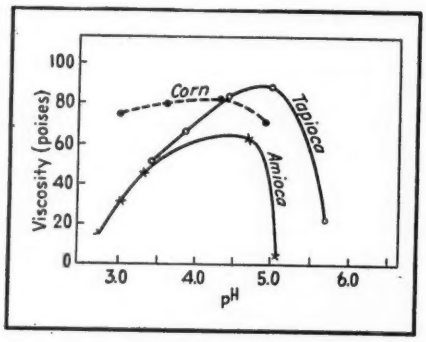


FIG. 6. Amioca and tapioca starches behave similarly under the influence of citric acid. These curves are for 1:12 solutions in water gelatinized 18 hours at 120 deg. F.

When starch is treated below the gelatinization temperature with dilute acids, the so-called thin-boiling starches are produced. Concentrated pastes of thin-boiling corn starch have a low viscosity when hot, but form a stiff, brittle gel on cooling. In contrast, pastes from thin-boiling amioca remain soft and fluid when cooled. They are very clear and are solubilized to a considerable degree when cooked; thus, "80" thin-boiling starch is almost 90 percent soluble. Although of little value as gelling agents, these products show promise in mixtures with dextrose or invert sugar to give sweetness and body to candy or jelly products.

There are other fields in which amioca shows promise for future development. For instance, its thin-boiling starches, especially those with lower viscosities, should be useful as laundry starch because of their penetrating power. They are satisfactory in paper coatings, due to their high adhesive strength.

Envelope gums and cotton sizing are other uses for which it seems particularly suited.

Research is still in progress on the properties and applications of amioca and the particular uses to which it is most suited.

The waxy corn program has demonstrated the possibilities of genetic improvement of corn to suit specific industrial purposes. The work described in this article is being carried out jointly by American Maize-Products Co., National Starch Products, Inc., Stein, Hall & Company, Iowa State College and the Bureau of Plant Industry.

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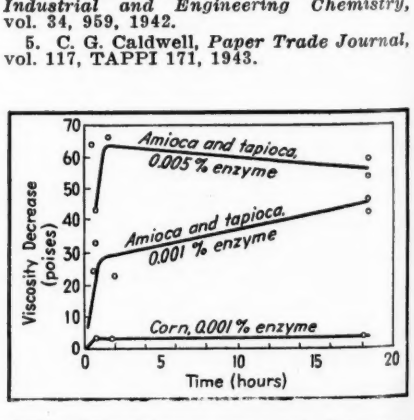

FIG. 7. Liquefying enzymes attack tapioca and amioca similarly. Common corn starch is more resistant. The thinning curves shown here are for the enzyme Wallerstein 10X.

Properties of Amylose and Amylopectin.

Property	Amylose	Amylopectin
Color with iodine	Deep blue	Reddish-brown
Shape of molecule	Linear	Branched
Approximate size of molecule (glucose units)	100-200	1,000-2,000
Action of beta-amylase enzyme	Almost 100% hydrolyzed	Only 60% hydrolyzed
Films formed by the acetyl and methyl derivatives	Elastic and coherent like cellulose	Weak and brittle
Tendency to retrograde or set back in solution	Strong, rapid	Weak or lacking

Drying Citrus Cannery Wastes And Disposing of Effluents

By J. L. HEID, Florida Citrus Canners Cooperative, Lake Wales, Fla.

Residues can be utilized completely in the manufacture of a score of byproducts. This eliminates the loss of more than 50 percent of the weight of the fruit. It also avoids complaints about a sewage nuisance

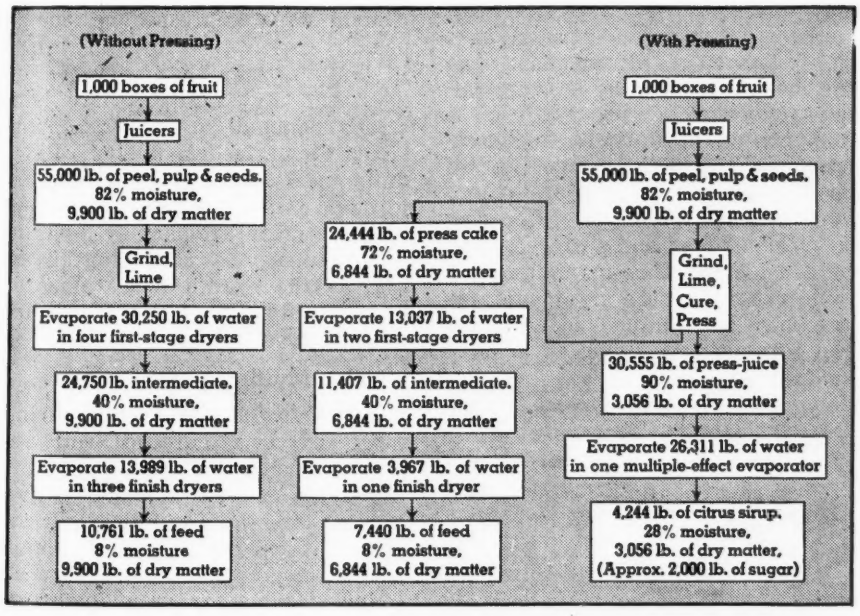
(Without Pressing)
1,000 boxes of fruit
Juicers
55,000 lb. of peel, pulp & seeds, 82% moisture, 9,900 lb. of dry matter
Grind, Lime
Evaporate 30,250 lb. of water in four first-stage dryers
24,750 lb. intermediate, 40% moisture, 9,900 lb. of dry matter
Evaporate 13,989 lb. of water in three finish dryers
10,761 lb. of feed 8% moisture 9,900 lb. of dry matter
24,444 lb. of press cake 72% moisture, 6,844 lb. of dry matter
Evaporate 13,037 lb. of water in two first-stage dryers
11,407 lb. of intermediate, 40% moisture, 6,844 lb. of dry matter
Evaporate 3,967 lb. of water in one finish dryer
7,440 lb. of feed 8% moisture, 6,844 lb. of dry matter
(With Pressing)
1,000 boxes of fruit
Juicers
55,000 lb. of peel, pulp & seeds, 82% moisture, 9,900 lb. of dry matter
Grind, Lime, Cure, Press
30,555 lb. of press-juice 90% moisture, 3,056 lb. of dry matter
Evaporate 26,311 lb. of water in one multiple-effect evaporator
4,244 lb. of citrus sirup, 28% moisture, 3,056 lb. of dry matter, (Approx. 2,000 lb. of sugar)

FIG. 1. Hourly performance flow-chart of citrus feed manufacture.

CONSIDERATION of the problem of disposing of solid and liquid cannery residues, without incurring losses or complaints, has been forced by the increase in citrus juice-canning to more than 40,000,000 cases annually.

Fresh orange and grapefruit juice-canning residues, comprising more than 50 percent of the weight of the fruit, are palatable and valuable feeds for beef or dairy cattle.[10] But the perishability of these materials ordinarily has prevented dumping them in pastures. In tests conducted in Texas,[2] chopped grapefruit residue and cornstalks were ensiled in trenches to produce satisfactory feed, but this development was never applied to the advantage of canners.

Canning residues include peel, pulp, seeds, cores and interlocular membranes. Liquid effluents result from processing and cleaning operations. From these residues and effluents may be obtained a variety of products, including fixed and volatile oils, waxes, resins, pectin products, cellulose, glucosides, sugars, feeds, fertilizers, sirups, yeasts, alcohol, fuels, plastics, acetic, citric and lactic acids, and so forth.

Various combinations of products are commercially manufactured and, by careful planning and control, it is possible to completely utilize canning residues, thus avoiding losses and complaints. As canning operations and population increase in citrus-producing areas, it is evident that complete utilization will become indispensable for successful citrus processing.

The manufacture of such byproducts as pectin, essential oils and glucosides does not utilize citrus residues completely. While the solid material remaining from these operations can be converted to a marketable humus fertilizer by aerobic or anaerobic fermentation or chemical treatment,[3] the most advantageous outlet for considerable quantities of orange and grapefruit residue is currently provided by the manufacture of feed and sirup. Hall[1] has discussed methods other than drying for disposing of lemon residues under conditions which exist in California citrus areas.

Light colored, fluffy dried citrus meal is used in livestock, poultry and dog foods. The range in its composition is, approximately:

Protein, fat and ash.. .....each 4 to 7%
Crude fiber .....10 to 17%
Pectic compounds ....15 to 19%

It is in demand among dairy-cattle feeders, who contend that citrus meal aids in maintaining maximum yields of milk. State experiment station investigators[5, 6, 10] report favorably on the value of the feed. One states that when fed in quantities up to one-fourth of the total ration, "general effects were favorable, as indicated by thrifty appearance, gloss of coat and improvement in thickness of flesh, making it appear that this feed belongs to that group prized by stockmen for beneficial effects."

"Final citrus sirup," made by concentrating juice pressed from citrus residues after liming, resembles "final cane molasses" in appearance and sugar content. It is valued for animal feeding because of supplemental food values extracted from citrus peel. It is also sought as a source for fruit spirits for use in cordials, brandies and fortified wines.

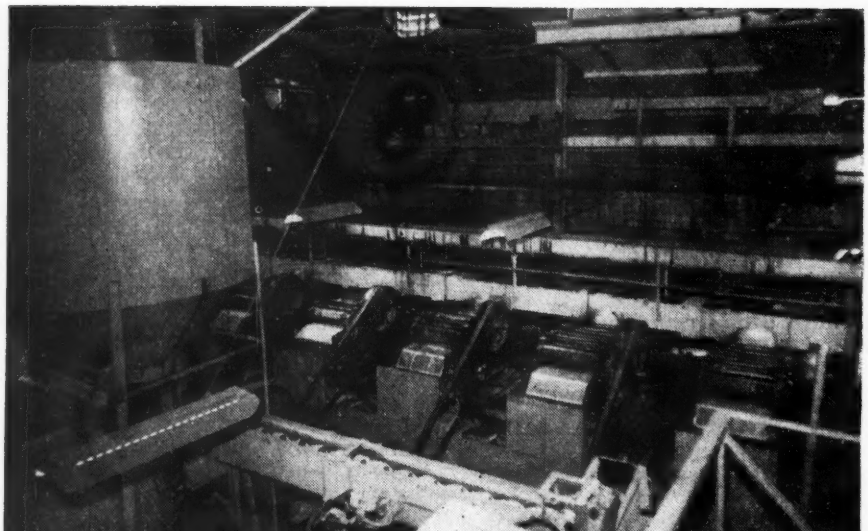

FIG. 2. General view in feed mill. Reaction bins may be seen in background; continuous roll and plate presses, in middle foreground; steam-tube dryer and cyclone dust separator, in left foreground.

Dried Citrus Pulp or Meal

In manufacturing dried feed, the mixture of peel, pulp and seeds is passed through hammer mills, choppers, shredders or slicers, and less than 1 percent of calcium oxide or calcium hydroxide is added. The lime substantially neutralizes citric acid and raises the pH value from about 4 to 6. This decreases its corrosive action on mild steel equipment. The lime also reacts with colloidally dispersed pectic constituents, reducing gumminess to prevent the product from sticking to hot surfaces during subsequent drying.

If this reaction is completed in bins or pug mills, the limed residue may be drained or pressed to separate the juice from the press-cake. The press-cake may be dried in kilns and the press-juice separately concentrated in multiple-effect evaporators.

Heid and Scott[2] applied the formula of Pearson[8] to a study of yields and costs of drying citrus canning residues with and without pressing. In their tests, they found variations in the moisture content of ground cannery residue ranging from 81 to 85 percent, and variations in the moisture content of press-juice ranging from 87 to 90 percent. The moisture content of the press-cake ranged from 71 to 77 percent.

Pearson's formula, as applied to the pressing of citrus residues, may be stated:

The ratio of the weight of press-cake to the weight of press-juice will vary inversely as the differences in the moisture contents of the final products and of the original residue.

Applying this formula to the extreme ranges in the composition of residue, press-cake and press-juice reveals large potential differences in yields of feed and sirup. Instead of considering this maximum possible range, a more significant figure may be obtained by applying the formula to residues of average composition. In Florida, typical samples in one plant tested approximately:

Ground residue....82% moisture
Press-cake .....72% moisture
Press-juice .....90% moisture

Applying Pearson's formula:

72 — (90—82) = 8 parts of press-cake
82
90 — (82—72) = 10 parts of press-juice

For each 8 lbs. of press-cake obtained, it is necessary to expel 10 lb. of press-juice. If 55,000 lb. of residue was pressed in this manner, 24,444 lb. of press-cake and 30,555 lb. of juice would be obtained. The hourly performance chart (Fig. 1) outlines operations on such a quantity of residue, with and without pressing. Whether pressing is desirable depends upon three factors: The extent of the market for final sirup, market preferences regarding the texture and composition of meal and relative costs of drying, with and without pressing.

As regards the cost of equipment for manufacturing feed with and without pressing, it will be observed from the Hourly Performance Flow Chart that, if pressing is not employed, more than double the evaporative capacity will be required in first stage dryers to handle the same quantity of residue. More than triple the evaporative capacity will be required in finish dryers. If pressing is employed, presses, screens, pumps and multiple-effect evaporators and supplemental equipment will be needed.

Concerning operating costs, if pressing is considered, savings in fuel must be compared with increased costs for labor, water and power.

Pulley and von Loesecke[9] reported the effect of variations in manufacturing methods upon the composition of dried citrus meal. In general, press-cake meal has a lower content of soluble carbohydrates and a higher content of insoluble protein, fat and pectic-compounds than meal made without pressing.

Meal from unpressed residue is usually darker in color and denser in texture than that prepared by pressing. At present, there is a strong demand for the final citrus sirup. Cattle feeders prefer a light, fluffy meal to absorb moisture rapidly and stimulate milk production. These considerations may well influence decisions regarding pressing, as the overall feed values of the pressed and unpressed feeds are not widely different.

Multistage Drying

After studies conducted during three seasons, Heid and Scott[2] reported certain advantages of drying citrus canning residues in two stages. In these studies, direct-heated, parallel-flow, rotary kilns 8 ft. in diameter and 10 ft. long were found suitable for removing mositure cheaply, rapidly and continuously from heavy flows of ground citrus residue. Hot gases came into contact first with the wettest material, which was kept cool and protected against burning by rapid evaporation of moisture. However, at the discharge and of the kilns, the hot gases had become cooled and saturated with moisture. These were unsuited for rapidly completing the drying of large particles of residue unless temperatures were raised to a point which resulted in the burning of fine particles. Apparently, the air velocities were not sufficient to carry these fines out of the dryer before they were overheated. Objections to excessive kiln temperatures (in addition to impairment of quality and reduction in yield of feed) include the hazard of fires from sparks in bagged feed, and the tendency of kilns to discharge dust.

With single-stage operation of the dryer, it was necessary to discharge gases at a temperature of 270 deg. F. to complete drying of the desired quantities of feed.

Disadvantages of single-stage drying were avoided when the discharge temperature from three of the four kilns was reduced to 230 deg. F. and the material from all these kilns, with a moisture content of 32 percent, was transferred to the fourth kiln operated as a second-stage dryer. Drying to 8 percent moisture was completed in this kiln with a gas discharge temperature of 180 deg. F. This yielded a lighter colored feed, eliminated burning of fine particles, and put an end to fumes and fires. Fuel efficiency also was improved.

The evaporative capacity of each of the three kilns operated as first-stage dryers was in excess of 8,000 lb. of water per hour, and that of the finish dryer was about 5,000 lb.

Since these tests were completed the operation of other dryers has been checked. The advantages of two-stage drying apply whether finish dryers were direct or indirect-heated. Steam-tube dryers are commonly used for finishing to facilitate close control of quality. It also has been observed that pulp may be transferred to secondary dryers when the moisture content is between 25 and 60 percent.

Manufacture of Citrus Sirup

Juice pressed from limed citrus residue contains approximately 10 percent of soluble solids, of which two-thirds is yeast-fermentable carbohydrates. It has a five-day biochemical oxygen demand in excess of 40,000 parts per million. Ordinarily city sewage-treating systems can handle only limited quantities. Discharging appreciable volumes of the untreated juice into lakes, streams or wells is objectionable because of the composition. Unless the press-juice is to be utilized in the manufacture of sirup, alcohol or other materials, dried citrus meal should be manufactured without pressing.

This press-juice ferments readily to produce alcohol[7] or to cause sugar losses.

To minimize corrosion of evaporation equipment in manufacturing sirup, it may be desirable to add caustic soda to the press-juice to raise the pH not, however, to exceed 7. Adding excessive alkali results in a dark color and unpleasant odor in the sirup. Note: Caustic soda solution used to clean evaporators may be advantageously returned to storage tanks for use as required in neutralizing acid in the press-juice.

In manufacturing final sirup, the juice should be protected against fermentation, dilution or contamination. It should be screened promptly through 60-mesh stainless steel screens and then heated in a high-velocity heat exchanger to a temperature above 220 deg. F. This should be done before it is discharged through an expansion valve into storage tanks. Heating the juice to flashing temperature before storage is desirable for several reasons: It substantially kills spoilage organisms. It expels noncondensible gases which may accelerate corrosion of evaporators. And it hastens the completion of chemical reactions which otherwise cause scaling in evaporator tubes and precipitation or foaming in final sirup.

During this flash heating, scale deposits rapidly on heat exchanger surfaces. It is well to install a tank to facilitate the circulation of caustic soda solution through the heat exchanger to remove the scale as soon as it begins to interfere with heat transfer. Parallel, duplicate preheaters permit continuous operation. Cleaning of tubes in evaporators with soda solution is periodically necessary, but periods of operation may be lengthened if the juice is preheated above 220 deg. F. before entering the holding tanks.

During and immediately after this heating, the clear juice will cloud rapidly and sludge will precipitate. This sludge may be separated from the juice before it enters the evaporators by gravity settling or by centrifugal deslugers. Separation of this sludge facilitates the manufacture of clear sirup.

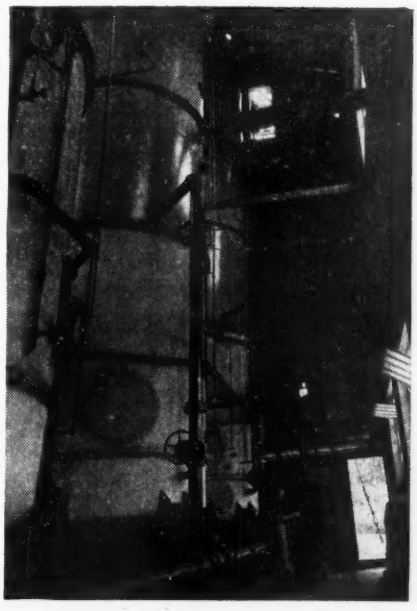

FIG. 3. Standard Classen or Calandria type, triple-effect evaporators in use for preparing sirup from juice pressed from citrus residues.

Whether there is a connection between preheating and the tendency of citrus sirup to spontaneously generate carbon dioxide gas when stored at temperatures above 90 deg. F. remains to be proved. Preliminary tests indicate that the addition of caustic soda to press-juice, together with preheating, accelerates chemical reactions and materially reduces foaming in the finished sirup.

Triple- or quadruple-effect evaporators are used to evaporate water from press-juice, yielding a sirup with soluble solids in excess of 71 percent. Vapors from each effect are condensed while heating the liquid in the following effect. It is desirable to bleed off uncondensed corrosive gases to accelerate heat transfer and protect equipment from damage. Because the viscosity of the liquid becomes high enough to interfere with rapid heat transfer after the Brix exceeds 55 deg., a small steam-heated, finishing pan may be used to complete concentration to 72 percent solids. This increases capacity and facilitates continuous operation of evaporators. Condensate from first and second flashings may be passed through skimming troughs to separate steam-distilled limonene, which has a market in the chemical industry.

The final sirup is screened as a precaution to separate scale particles which may have loosened in evaporators. The sirup may be blown with compressed air, if necessary, to avoid foaming during shipment and storage.

Thought should be given to effluent disposal before a plant is established, or difficulties may be encountered for which there is no practical solution.

While no method may be prescribed to fit all plants, in Texas and Florida economical disposal of effluents usually depends upon the segregation of the four types of effluents and handling somewhat along the following lines:

1. Sanitary sewage from toilets, lavatories and showers should be carefully segregated and handled in a separate line to city sewers, if available, or to septic tanks or other standard treating devices

FIG. 4. Discharge end of battery of steam-tube dryers handling citrus pulp feed.

where city sewage connections do not exist.

2. Waste waters from coolers and condensers, substantially free from color, suspended and dissolved solids, should be carefully segregated and may be handled through storm or other drains of adequate capacity. This material is often useful as a diluent for the effluent from treating other wastes. If available without contamination, it may be returned to disposal wells to conserve underground water supplies.

3. Rich juices or liquors pressed or drained from cannery residue range from 8 to 12 percent soluble solids, of which two-thirds is fermentable carbohydrates. Methods of using this liquid for the manufacture of sirups have been described. This juice also may be utilized in the manufacture of feed yeast or fermentation products such as industrial alcohol[7], or lactic or acetic acid. Commercial applications have been made of the manufacture of sirup and industrial alcohol. Potable alcohol can be made after first concentrating the juice to at least 25 percent soluble solids to remove limonene, which otherwise would flavor the alcohol.

The effluent (commonly known as "still slop") from the manufacture of alcohol from concentrated press-juice may present a disposal problem, unless the yeast sludge is separated by a centrifugal desludger or other means before the liquid enters the still. Separation of the yeast sludge before heating permits removal of colloids and nitrogen compounds, and may simplify the problem of disposing of an effluent which is comparatively stable. After adequate dilution with large volumes of cooling and condensing water, this effluent often can be allowed to flow into any stream or drainage ditch or into unconfined salt water outlets, where continuing dilution and aeration prevent odor nuisances or injury of fish.

4. Dilute waste and leachings range from about 0.3 to about 2 percent soluble solids. The simplest waste of this type is the leakage and drainage from juice-canning and equipment-cleaning operations. Leachings discarded in the manufacture of pectin compounds may resemble this material in composition and concentration.

The first requisite in handling this material is screening through 60 mesh or finer screen. Screenings may be dried with other solid residues. The screened liquid often can be discharged into city sanitary sewers, provided any necessary adjustments are made in the pH and the capacity of the treating plant is adequate. This is essentially a carbohydrate waste, while sanitary sewage is high in nitrogen compounds. A proper balance of the two may increase the efficiency of sewage treatment. However, overloading conventional sanitary sewage plants with such effluents will interfere with proper functioning.

Von Loesecke and associates[11] demonstrated the high cost for equipment and operation of plants to treat this waste by methods developed for sanitary sewage. They found it was necessary to add nitrogen to secure satisfactory operation of trickling filters.

During two seasons, Heid and Scott[2] tested fermentation as a method for treating the entire mixed effluents of four citrus juice canneries and one citrus meal drying plant in Texas. The sewage at each plant was screened, inoculated with ordinary bakers' yeast and discharged into a concrete drain pipe. After flowing 1½ miles through this enclosed drain, the combined wastes arrived at the treating station unmixed with other sewage. After rescreening through a tumbling, 40-mesh sewage screen, the liquid had an average pH of about 4.8 and ranged from 1 to 2 percent of soluble solids. The B.O.D. tested 1,000 to 5,000 p.p.m. The screened liquid was allowed to flow through a series of three fermenting pits, each 10 ft. deep, 15 ft. wide and 150 ft. long, connected by shallow ditches containing ripple boards. Baffle and scum boards were spaced at 10 ft. intervals in the pits to impede the free flow of liquid. The pits were connected in series at progressively lower levels to permit gravity transfer. The combined capacity permitted a total retention period of 48 hours at maximum flow.

Facilities were not available for cleaning or draining the pits, which filled with white sediment during 60 days of operation so that it was necessary to prepare new pits and abandon the original series. It was observed that so long as the flow of screened waste was maintained, a light-colored sludge was formed and a clear effluent with a minimum of 25 percent reduction in B.O.D. was discharged from the pits. The effluent possessed a faint, unobjectionable odor resembling that of vinegar. The pH of the effluent ranged from 3.5 to 4.5. The effluent was discharged over ripple boards into a drainage ditch where it mixed with soil drainage. After flowing 2 miles, the ditch emptied into flowing Llano Grande Lake.

Whereas allowing the untreated material to flow into the ditch had previously resulted in the destruction of fish for several miles, minnows commonly swam at the bottom of the ripple boards discharging the effluent, and no killing of

fish or odor nuisance was ever observed at the discharge or further down the ditch or lake.

When the flow of dilute waste was interrupted for more than 36 hours, anaerobic fermention in yeast-sludge in the pits caused gas formation which brought sediment to the surface, where it darkened and developed a bad odor.

These tests on the fermentation of large volumes of dilute citrus cannery wastes in unlined dirt pits—without provision for aeration or for removing the yeast sludge—are promising. They indicate the possibilities of using continuous fermentation and sludge separation as a practical method for treating effluents. After these are mixed with cooling waters they might be disposed of under any condition where drainage would provide adequate dilution and aeration and avoid accumulation of the material.

In laboratory tests, similar dilute waste was innoculated with starters prepared from cultures of bakers' and wine yeasts with and without added ammonium sulphate. The mixtures were aerated during fermentation. The reduction in B.O.D. was increased from 25 to as high as 65 percent, indicating the possibilities of controlled fermentation.

It is well to consider the difference in fermented and unfermented effluents. The five-day B.O.D. test is no criterion for comparing the pollution potential of fermented and unfermented waste. Otherwise, plant waste dilution would produce equivalent results. Actually, diluted material has substantially as great a fish killing action as the original liquid. Yet fish thrived in effluent in which the B.O.D. had been reduced by fermentation so long as the drainage prevented accumulative intensification of B.O.D. Observation indicates that, as long as the fish oxygen supply is not interfered with, waste material substantially stabilized is tolerated and perhaps even consumed as food by the fish.

Acknowledgment — W. C. Scott shared in the work described in an unpublished report and in the second listed reference.

The author is indebted to J. J. R. Bristow, E. L. Moore, C. D. Atkins and Eunice Wiederhold for reviewing this manuscript.

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SUNKEN SIDINGS Allow Easy Loading

Loading platforms can be put on a level with freight car doors and truck tailgates by depressing the R.R. siding and truck-dock roadway. Better than elevated first floor

By FRANCIS CHILSON
Industrial Consultant, New York, N. Y.

IF FACTORIES are built on the ground level, everything shipped out must be lifted into the freight cars. If they are built at car-door height, the advantages of direct loading into cars and trucks are obtained. But when the first floor of a building is raised above the surrounding grade, the floor must be supported on footings, or else the ground enclosed by the foundations must be filled and compacted. Both procedures are expensive and unnecessary if your plant site is selected with care. You can build a building directly at grade and secure the advantages of tailboard loading of trucks and car-door loading for freight cars by depressing the railroad siding and the truck docks. The railroads will permit a siding to be depressed with a maximum grade of 1½ to 2 percent. This emphasizes the desirability of locating a site where most of the drop can be made on railroad property so that the car floors will be at grade level when the cars enter your own premises.

Truck docks can be ramped down easily from the street to a loading platform at grade level. Trucks can be loaded and unloaded at a much steeper pitch than the railroads are willing to permit in handling freight cars. A drop of 3½ ft. in 40 ft.—the overall length of a 10-ton trailer truck—is standard practice in many parts of the country. If the plant site is not located in a city, which might impose objections to regrading sidewalks, the ramp into the truck dock can be made longer and with a correspondingly easier grade.

Manufacturers who utilize large volumes of liquids which are received in tank cars should make provision in their original siding layout for a double-track siding. Then the tank cars can be spotted on the outer siding and unloaded without interference with boxcars located on the inner siding along the shipping platform.

Inside Sidings

The question often arises as to whether a siding shall be housed within a building or on the outside. Loading cars on an inside siding is certainly easier and pleasanter, especially in winter. It is a very practical procedure when switching is done not more than once or twice a day, particularly when several cars are involved. Inside sidings, however, do require more building space, and this factor should be considered.

WAYS TO SAVE WATER In the Food Plant

By IRVING REICHMAN, Water Inspection Division,
Department of Water Supply, Gas and Electricity, City of New York

A careless employee, a dripping tap, a high water bill—this is an all too familiar sequence in large plants and small.

Part II—To economize in the use of water, it is necessary to layout the process in such a way that suitable water may be reused. Vigilance against leaky equipment and conservation-training of personnel are also required

THERE are a number of possibilities for economy in the use of water for refrigeration and cooling in the food processing industries.[2] The most important use of water in refrigeration is for refrigerant condensing. Here, lower costs are generally a matter of obtaining a cheaper source—such as a supplementary, nonpotable supply or the water discharged from some other process—reducing the water demand by installing a water-conserving device, or utilizing spent condensing water for other purposes. Besides refrigerant condensing, water is used in other cooling processes.

When a factory is located beside a watercourse and use of that water is not prohibited by local code, it is customary to supply the refrigerating plant from this source. This is especially true of plants having large refrigeration demands, such as meat packing and food freezing plants. The use of such water is generally profitable, but there are conditions—as, for instance, where the stream is badly polluted—under which it may not be. Polluting material of a corrosive or putrescible nature may have a destructive effect on equipment or reduce operating efficiency. If such a supply must be used, open shell-and-tube condensers are preferable to the closed type. Compressor cooling jackets should never be connected to a corrosive supply.

Well Water

For cooling, the main advantage of directly pumped well water is its temperature, which is generally much lower than the summertime temperature of reservoir-stored water. The chief disadvantages usually encountered are scale-forming hardness and undependability. These are matters of local geology. The first can always be corrected if necessary.

A unique well-water situation has arisen in certain concentrated industrial areas of Long Island, and may possibly exist in similar areas elsewhere. Under the provisions of the New York State Conservation Law,* water pumped from wells on Long Island and used for cooling and certain other purposes is generally required to be returned uncontaminated to the ground through diffusion or return wells on the premises. The water which is returned to the ground after use may be considerably warmer than the incoming water, depending on how much heat was abstracted. For any one factory, it is easy enough to install the diffusion well downstream from the service well so that the temperature of the outgoing water will not affect the temperature of the incoming water. However, with a large number of plants crowded close to one another and with water being pumped at various rates and discharging at various temperatures, it takes little imagination to see that a point is reached when the terms "service well" and "diffusion well" and especially "upstream" and "downstream" lose much of their significance.

The situation becomes an evil cycle when a plant operator decides to pump harder in order to offset the effect of the higher incoming water temperature, since greater volumes of warm water are then returned to the ground. The indicated corrective appears to be less pumping and smaller temperature differentials. One chocolate manufacturer located in such an area decided to install evaporative condensers to help overcome well-water deficiency.

For the use of discharged process water directly for condensing, the primary requirements are quantity

The group washfountain for employees is an important water-saving device.

*Article XI, Section 521-A.

and temperature, provided that the quality is satisfactory. When of ample volume and continuous flow, spent water from cooling sprays, cold rinses and similar uses—where the discharge water temperature is not above 75 to 80 deg. F. —is usually suitable for direct condensing. Where such water does not discharge under pressure, it must be collected in a tank or sump, but the only cost attached to its use is for pumping. Where the flow is insufficient for direct condensing, such water may be used for makeup.

Conserving devices for refrigeration water fall mainly into two classes. One comprises natural- or mechanical-draft cooling towers and similar equipment. The other includes evaporatively cooled condensers, of which there are two corresponding types. Regardless of the device used, the saving in water is roughly 95 percent of that required for directly supplied surface condensers.[3]

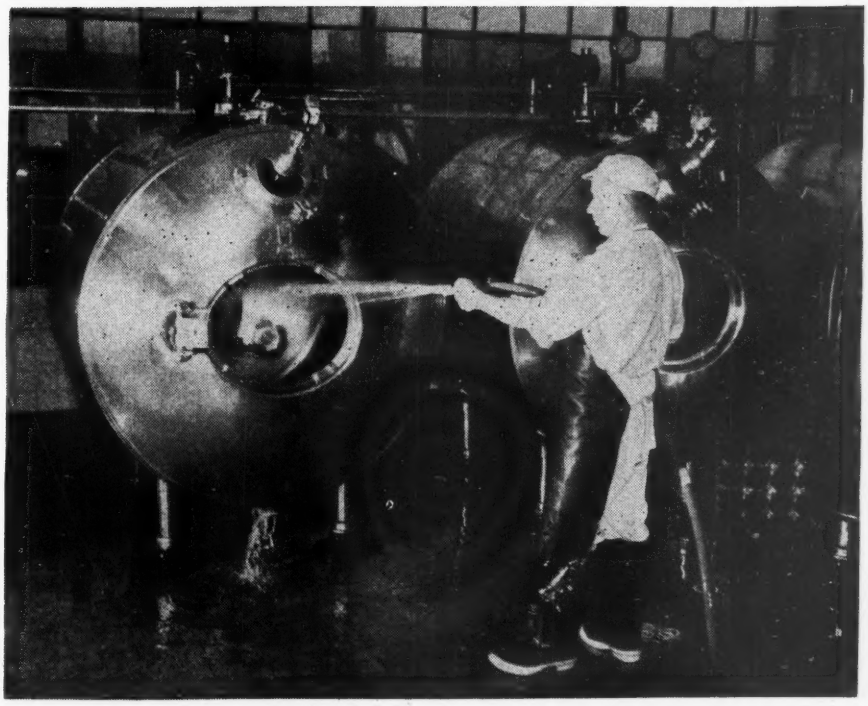
Conservation Mandatory

The question of whether or not to install a water-conserving device comes up frequently. From the standpoint of the individual company, the answer generally hinges upon economic considerations. When public water supplies are used there is also a legal aspect, concerned with the responsibility for water conservation, a matter which is becoming a serious municipal problem.

Public water supplies have not been able to keep pace with the prodigious growth of commercial and industrial refrigeration and air conditioning, and municipalities have found it necessary to regulate the use of water for such purposes. Take New York City as a case in point. Despite the fact that it is favored with a comparatively abundant water supply, the city, in 1940, instituted regulations making the installation of a water-conserving device mandatory wherever the annual consumption for air conditioning exceeds 350,400 cu. ft., or 5 gal. per minute.*

The writer made followup checks of a large number of water-conserving installations, and in all but a few instances it was found that the job paid for itself. Even in the uneconomical installations the trouble usually was due to poor engineering or to improper maintenance or operation.

*Rule 46, Department of Water Supply, Gas and Electricity—Rules and Regulations, 1940.



Water used in cleaning dairy process equipment cannot be reused. An automatic nozzle on the hose, as shown here in a Borden Co. plant, assures that water is not wasted by running when it is not required.

Evaporative Cooling

The makeup water required to replace evaporation and other losses in cooling towers and evaporative condensers may be supplied directly from the building main, or from a spent water source such as a suitable discharge from some process. The temperature is not too important, although it should not exceed that of the off-tower or recirculating water. It is important, however that the water be reasonably clean and free of any suspended or dissolved material of a decomposable nature. This applies likewise to the air passing through the cooling tower or over the condensing tubes.

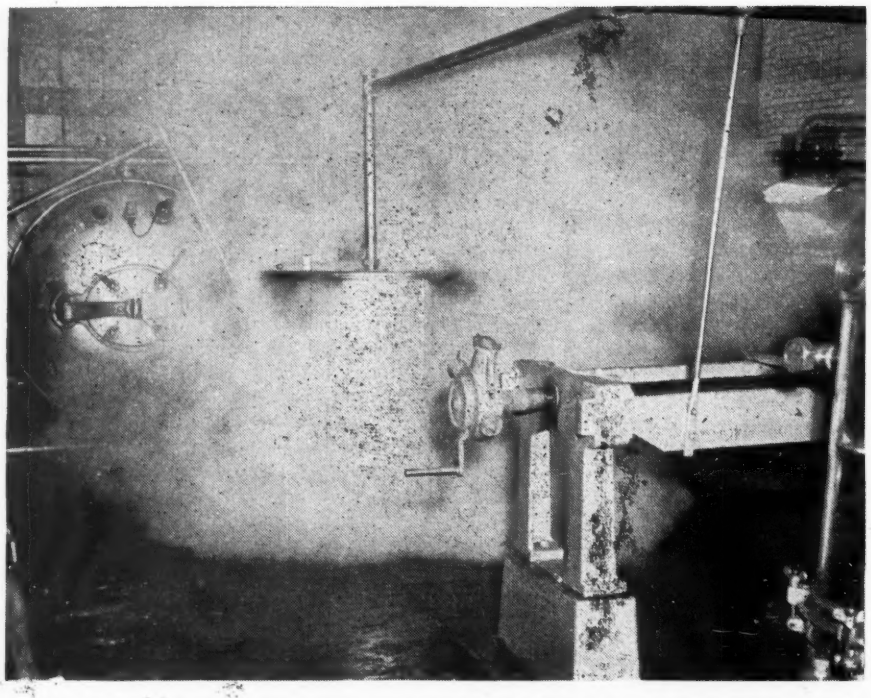
The writer had occasion to examine two newly installed evaporative condensers in a candy factory. After only six weeks' service they had developed trouble that resulted in an unusual increase in water demand. The head pressure jumped several pounds, and to keep the pressure down the operator was compelled to increase the water flow. This he did by removing the makeup float in each condenser pan, so that there was a steady flow and overflow of water. That is, instead of the usual combination of evaporative and direct heat-transfer cooling, an attempt was made to operate the units as straight water-cooled surface condensers.

Investigation showed the existence of a heavy gelatinous coating on the coils and interior wetted surfaces of the condensers, and some of the same substance in suspension in the recirculating water. The coating impeded heat transfer, interfered with evaporation and reduced the capacity of the condensers, accounting for the increased head pressure. Also the spray was scanty, because of obstructed nozzle openings.

A sample of the water examined in the laboratory disclosed an amazing microbiological content. The gelatinous material was teeming with bacteria and other microorganisms. The principal causative agent proved to be dust contained in the factory air, drawn in by the condenser fans. This dust was a mixture of particles of flour, sugar and other confectionery materials, and made an excellent nutrient medium.

The condition was corrected by cleaning and isolating the condenser and by installing an air intake duct connecting directly to the outside atmosphere. There was an immediate drop in demand for water and power.

For cooling towers, evaporative condensers and other evaporative cooling devices or systems, efficiency is directly related to the relative humidity or moisture content of the air. The film of water on the evaporative surface absorbs heat from the substance being cooled, and



Steam for cleaning equipment represents a water and heat load that must be considered in the overall water economy plans of many food plants. This picture shows a routine cleanup in a Borden Co. plant.

this, as latent heat of vaporization, is given up to the surrounding air by the water which is vaporized. By carrying away the heat-laden vapor, the air becomes the indirect medium through which cooling is effected. Since air can absorb moisture only up to its saturation point, it follows that the drier the air the greater its moisture absorbing capacity, other conditions remaining the same. For efficient evaporative cooling it is essential that the air entering the condenser housing or cooling tunnel be as dry as possible, and that the warm, moisture-laden air be removed as rapidly as possible. Where evaporative equipment is located indoors or supplied with indoor air, it is advisable not to have the intake duct inlet in the cookroom or in any other place where water is vaporizing or steam is openly vented.

Direct Cooling

There are in common use three product cooling methods which employ water as the direct cooling medium. These are direct heat transfer in some form of heat exchanger, immersion cooling and spray cooling (which includes evaporative cooling). The first is used for fluid and semifluid products. Heat passes from the product to a water-cooled surface. The cooling water discharges at a higher temperature and is recoverable. Economy depends on the possibility of reusing this water for other purposes. Where chilled water is used for the cooling, it is generally recirculated between the product cooler and the water cooler in a closed system, the prime consideration here being refrigeration rather than water conservation.

Immersion cooling and spray cooling are used chiefly for canned and bottled products. In some cases, the cooling water is economically recoverable, in others it is not.

Where applicable, spray-type coolers are usually more economical than immersion coolers, one of the disadvantages of the latter being that the temperature of the incoming cold water is raised by the body of warmer water in the tank and by the entering hot bottles or cans. Also, the conveying action is often such that the containers entering the tank cause stirring and upset the natural convection currents, with the result that water which runs off through the overflow pipe may not have done its full share of the cooling job.

One manufacturer of canned confectionery sirups reports a saving of over 90 percent on cooling water costs by changing from immersion to spray cooling. The unit consists simply of a rolling can conveyor above which two spray headers are supported longitudinally. The nozzles deliver a fine spray which covers the cans with a thin film of water. Cooling is achieved by direct heat transfer and to some degree by evaporation, the slow rolling of the cans being an aid to the process. The cans are dry and cool enough for stacking when they reach the end of the conveyor.

Water-cooled Equipment

A water-consuming item which demands occasional checking is the water-cooled roller mill. The water is required primarily to remove friction heat. In summer, when both air and water temperatures are high, the water demand is high, in winter the condition is reversed, yet temperature and flow measurements in a variety of plants showed quite a few instances where the same cooling water flow was used when incoming water temperature was 40 deg. F. and when it was 70 deg. It appears that machine operators—a good number of them at least—will invariably do the same thing, such as opening a hand valve fully, regardless of changing seasons or changing needs.

With a little experimentation, the plant superintendent or engineer can determine the most economical flow, a convenient criterion being the outgoing or off-roll water temperature. Then, for the same roll setting and with the outgoing water temperature as a guide, the engineer can make seasonal adjustments or give the necessary instructions to machine operators regarding valve opening turns.

The candy-cooling slab is in the same class as the roller mill. Since it is generally hand controlled, it can also become wasteful of water. Slab coils have been found running at full flow during lunch hour and at other times when the slabs were not in use.

Equipment requiring cooling water which will be taken directly from the building main should be set as near the point of entry of the service pipe as practicable. Where this cannot be arranged, a separate branch may be taken off near the point of entry and insulated to insure a colder supply of water to the units.

By giving a little thought to the matter, a plant engineer can usually manage to find some use for clean discharge water. In one biscuit bakery, as a case in point, the water discharged from the gas compressor cooling jackets is used for summertime roof cooling. There is sufficient residual water pressure at the compressor jacket outlets to feed the roof sprays without pumping, thus putting waste water to

(*Turn to page* 212)

EDITORIALS

LAURENCE V. BURTON, Editor

Speculating in Wages

SPECULATION brings the future to the present, said Dr. E. A. Goldenweiser of the Federal Reserve Board several years ago.

Labor is speculating in wages, Leo M. Wolman told the Grocery Manufacturers of America at its recent convention.

While Dr. Wolman's statement is entirely consistent with that of the sage of FRB, he also added this: Speculation in wages will shorten the post-war boom. Speculation brings a collapse. The greater the speculation the more severe the collapse. But business will be blamed for the collapse—not the speculators.

Give the Calf Enough Rope

INCREDIBLY bad seems to be the only term to be applied to the timing and strategy of the unions which are seeking to deplete corporate reserves by insisting on wage increases while disapproving of price increases. Not only are the unions courting drastic regulation in the future—from which they may never again be free as they are today—but they are ignoring the purpose of corporate reserves. It should be apparent to even the most dimwitted that reserves are their only cushion against lay-offs the moment orders stop coming to the factories.

The foregoing is not the end. Continued agitation for a 30 percent wage increase has goaded management to develop new machines, now on the drawing boards. Some of these new automatics will do the work of from two to six men, if predictions are borne out.

There is nothing vindictive in the foregoing trend. Men achieve management responsibilities largely by reason of their foresight and resourcefulness. Placed in a price squeeze, such as union demands and OPA ceilings create, there is only one recourse to the resourceful: to call upon the genius of the machine. It may be possible that the miracle of higher wages without price increases can come to pass.

But it will leave unsolved the problems which the labor-management conference recently abandoned without agreement on any vital point.

Hungry Italy Tests Wood Flour

SOME idea of the food problem in Europe can be gleaned from a report received at these offices regarding the use of wood flour as a bread ingredient, or bread extender, in Italy.

"It was found that bread made with the addition of 5 percent of cane plant (*Arundo donax*) flour reveals, upon mastication, the presence of small woody needles; with the addition of 10 percent the taste is decidedly woody and is accompanied by creaking under the teeth and by a sense of irritation in the throat.

"With the addition of 5 percent of flour from hydrolyzed poplar wood, no difference was noticed from the standard bread (made from 88 percent extraction flour); with the addition of 10 percent, the woody taste was hardly noticeable and there was noticed a slight sensation of aridity in the mouth.

"It is to be concluded, therefore, that bread made with the addition of cane plant flour, even if in small quantities, is not fit for consumption."

The report further concludes that poplar wood flour would be advantageous in bread, if necessity arises, provided the woody taste can be eliminated.

Germany Also Starves

EVERY hospital in Germany is filled with starving Germans suffering mainly from nutritional oedema, according to a reliable observer who has just returned from that country. He adds that it is a mathematical certainty that 1,600,000 Germans will die of starvation this winter unless relief comes. His view is that, regardless of the grim justice of such retribution, if we allow starvation to continue there we are sowing the seeds of another war by driving the Germans into embracing Communism in order to survive.

Nice dilemma!

Anhydrous Foods, Successor to Dehydrated

CLARENCE BIRDSEYE, whose name is the most widely known in the frozen food field, has made another contribution to food preservation. His development of quick dehydration parallels his quick freezing development.

It is now possible to remove water from vegetables in 90 minutes in contrast to the much longer drying cycle (about 8 to 18 hours) in many forms of tunnel dryers. A drying time of 90 minutes is not much longer than the freezing time of consumer packages of vegetables, or the heat sterilizing time of No. 2 cans or glass jars.

The speed of drying, though of very considerable importance for the economy of production, is apparently of even greater technological importance. The quality of Birdseye quick-dried vegetables is such that the term "anhydrous vegetables" has been coined to differentiate them from wartime dehydrated vegetables. And consequently the term "anhydrator" identifies the Birdseye rapid dryer.

What the future competition will be between chilled (fresh), canned, frozen and anhydrous vegetables is a matter to be studied. That the commercial future of the latest comer to the field will be dependent on consumer acceptance of anhydrous foods is obvious. But American Home

Foods Co. did not undertake to exploit this Birdseye invention in the face of all the current sour G. I. remarks about dehydrated vegetables without assuring itself that the new products were of superior merit.

Our final comment is that this invention is in line with the trend of the times toward continuous, automatic processes. The processing of food grows increasingly complex while their use becomes increasingly simple.

Cannot Be Cured by Proxy

ONE of the principal owners of a struck food plant was aghast at our suggestion that he invite the union leaders to spend an evening with him, just to get acquainted. His objection was based on the idea that, as he was not active in management, such a move was not properly his.

This gap between ownership and workers often cannot be bridged by industrial relations departments and by union officials. It cannot be successfully accomplished by proxy. In fact, it seems to be the very basis of much of the current strife.

While it is impossible to undo past errors, it is possible to make a fresh beginning. There are too many middle men in the rapidly worsening field of employee relations.

Save Your Copies of Food Industries

YOU are advised to save all your back copies of FOOD INDUSTRIES and have them bound by volumes. The Annual Index is available free to any subscriber who asks for it within a reasonable time after the first of the year.

Any copy of the magazine that is discarded is gone forever during this day of paper shortages. Yet the common practice of many firms is to write to us to send another copy of an issue some two or three months old which had been recalled to have contained some vital information. It can no longer be supplied. Every back issue of FOOD INDUSTRIES went to the scrap paper drive in 1944, and no extras are saved today.

Food companies that bind the annual volumes of this publication have a wealth of information that will pay dividends on its keep. It will also save you considerable time.

Shelf Life of Frozen Cooked Foods

FOOD TECHNOLOGISTS who are working on technical problems of food preservation by some of the new applications of technology must not ignore the various distribution technics. Frozen ready-cooked food, for instance, does not need to remain in first-quality condition for eternity or even for years. All that is needed is for it to remain in prime edible condition as long as it is economic to store it. How long, is a matter for experience to determine.

A time limit on the merchantable life of a food does not preclude commercial success. There is a distribution system in existence for every known period of merchantable life, from 24 hours for bread, 48 hours for milk, 7 days for coffee, 16 days for beef, 30 days for ice cream, 90 days for marshmallow or mayonnaise to many years for certain canned vegetables.

No technologist need be worried by any technical limitations of "shelf life" for, in general, experience has shown that the shorter the life, the more profitable has been the business. This characteristic should not, however, deter any one from reducing the ultimate cost to the consumer by improving the technology of production, preservation, packaging and distribution. For such cost reduction always improves the competitive position of a food.

Hazards of Refrigeration

DEATH by freezing in his own ice cream hardening room came to S. H. Perry, of Stamford, Conn., on a Sunday morning this past summer. He had forgotten that the inside releasing plunger had been removed from the refrigerator door for repair. Once inside, he could not get out nor summon aid, because the plant was closed. He was frozen stiff when discovered several hours later.

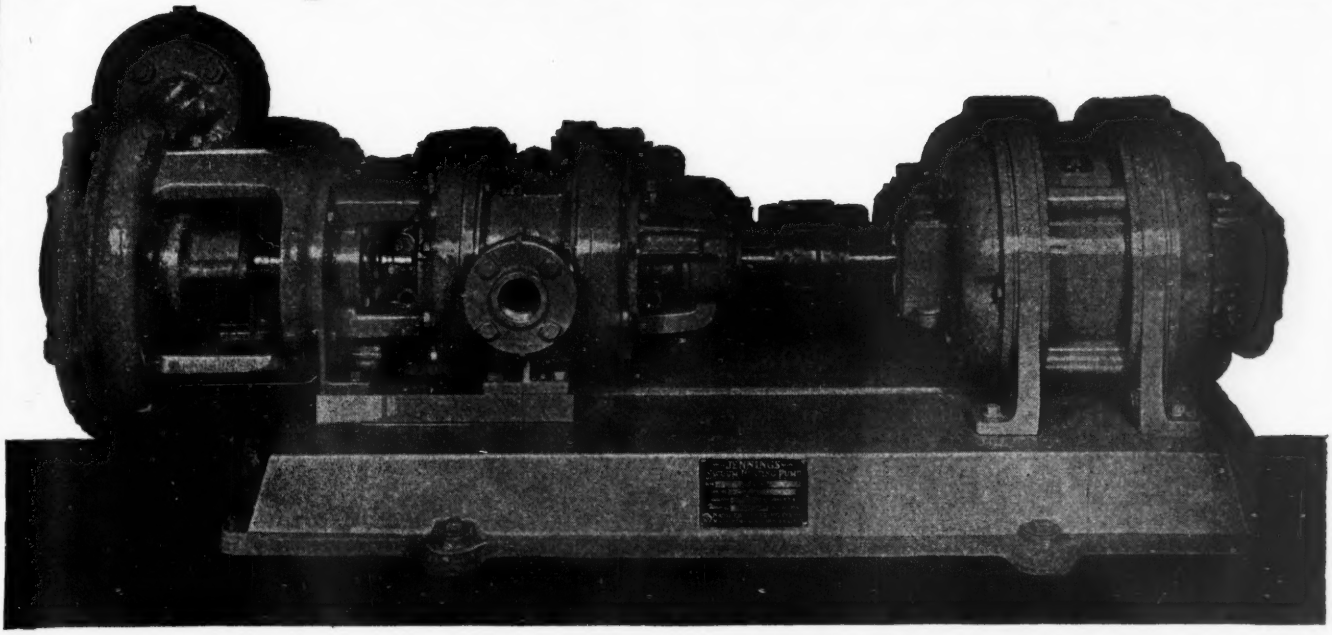
A simple sign on the door warning of the condition of the lock might have averted the disaster. Or complete removal of the lock during its repair would have been even more effective. The door could have been propped shut for a day or two.

Low temperatures are not ordinarily regarded as a hazard, yet they deserve proper respect. We once entered an air-blast freezer where the temperature was 50 deg. F. below zero. Despite the good condition of the door lock, it was impossible to open the door from the inside because ice had wedged it shut. Fortunately, the plant was operating, and a nearby worker came to the rescue before anything serious occurred. The door should have been kept clean.

Ammonia systems occasionally break, releasing huge quantities of the refrigerant, which in concentrated form can cause death very quickly. Very often the compressors, receivers and evaporators are located alongside the only exit, which would make escape impossible if the leak arose at that point. For such a situation, two remedies are suggested: (1) Build an emergency exit as far as possible from the place where a serious ammonia leak could occur. (2) Locate both the emergency stop switches and the ammonia cut-off valves so that the handles are *outside of the building*, where the whole plant can be shut down in safety. The latter not only may save lives, but also valuable ammonia, even when no safety hazard is incurred.

One shudders at the total ignorance of ammonia hazards in some of the newer quick freezing plants, and the complete lack of either of the foregoing precautions.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

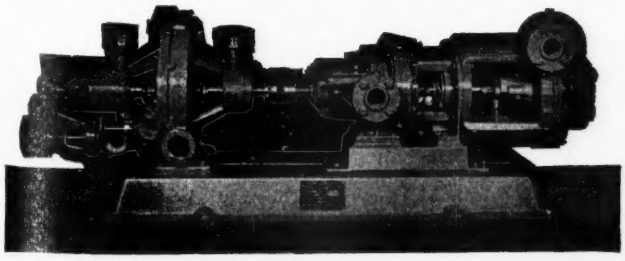


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK • CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

All Rye

YEAST-RAISED rye bread canned by Horlamus Hypo Allergic Foods, Miami, Fla., contains only rye flour, vegetable shortening and the yeast. Unlike the European pumpernickel, which has been canned for many years, this bread is light and dry. It is vacuum sealed as soon as it comes from the oven, 10-oz. filling a No. 2 can.

The story behind the product is that it was developed to meet the requirements of a member of the Horlamus family, and decision to can the bread on a large scale was reached as a result of requests from others with similar allergic conditions.

Cake Box

WELL-DESIGNED packages are of great importance to smaller companies making high-quality products. A good example of what can be done in this class is a carton designed by Robert Gair Co.

Mrs. Mason's Rum and Brandy Fruit Cake contains the finest materials available. The list of ingredients is as usual, eggs, vegetable shortening, sugar and honey, flour, leavening agents, spices, glacé and diced fruits, raisins and nuts, with rum and brandy for flavoring. A mold inhibitor is also incorporated.

Both 1-lb. and 2-lb. units are made, the same design being used on both boxes. The colors are enough out of the ordinary to attract attention. Peacock blue and chocolate are the background colors, with an orange-red for the ribbons incorporated in the design. The color scheme will stand up in holiday displays, but there is no element in the design that is contrary to the present tendency to offer fruit cakes for year 'round sales.

The baker, New Essential Cheese Cake Co., Brooklyn, N. Y., distributes almost entirely through baked goods sales organizations maintaining door to door routes, or to institutional customers in the New York Metropolitan district.

Stahl-Meyer Spreads

SANDWICH spreads in 6 oz. cans are convenient and very useful, in the opinion of Stahl-Meyer, Inc., New York, which is introducing a number of new spreads in this size, emphasizing in every case the quality of the product.

The labels for the cans have been carefully planned. First, the name of the product is made the most prominent feature, printed plainly in dark letters against a white background. Then the red band with the Stahl-Meyer logotype is put where it can be seen and recognized instantly, without detracting attention from the all-important product name. Decorative value is added by small color pictures of sandwiches and salads, to suggest uses.

The list of ingredients is printed not merely legibly but so that it is almost sure to be read. It is the belief of this company that the ingredient list is an important part of the label, showing in every case that the spread is all meat, without the addition of any filler.

The always-popular Liverwurst

Bulk label has been redesigned to correspond with those for the new spreads.

In introducing new products, Stahl-Meyer capitalizes in an unusual way on the good-will possibilities of preliminary samples sent for test purposes. A special label ties in with the general plan and emphasizes the importance placed on the opinion of the sampler. Each label, neatly printed in the same colors and general arrangement as the final one but with space to type in product name and ingredients, carries the legend, "Under development in our Research Department. May we have your opinion on this product?"

Topping

PEANUTS broken into fairly even bits, with the smaller particles removed, are treated with oil of almond, for use as topping for cakes and other desserts. Newark Packing Co., Inc., Newark, N. J., packs these, as Aster-Ettes, in glass jars each holding 3 oz.

Yellow, dark blue and red are used in the label.

Cold Oysters

IT has been stated recently that "anything can be quick-frozen," and that at least a thousand items have been worked on for possible commercial development. So hardly any quick frozen food is "new." However, Oysters Newburgh, packed by the C. F. Van Valin Co., Seattle, Wash., adds another product to the list that is commercially available.

The formula does not correspond to the sauce usually called "Newburgh." Green peppers, onions, pimentos, mushrooms, parsley, salt and spices lend flavor to a smooth milk and flour cream sauce. Large

pieces of tender oyster are included.

Fourteen ounces are frozen in a wide-gusset parchment bag placed within a one-piece, top-opening waxed carton. A maroon and white label, the size of the largest face of the box, is laid on the plain white carton under the heat-sealed wax paper outer wrap. Besides the usual information, the label carries a warning that the package must be kept below a temperature of 0 deg. F. until ready to thaw and use the contents.

A Tennessee Product

ANOTHER good crust mix is on the market. This one is attractively boxed in a brown, red, and cream carton bearing the Mis' Julie's trademark. It is made by Patten Food Products, Chattanooga, Tenn.

The 9 oz. of blended wheat flour, hydrogenated vegetable shortening and salt makes two crusts for a 9-in. pie. Additional recipes, illustrated on the back panel, produce cheese straws and pecan strips. The mix will also make tarts, pastry shells, cobblers, timbales, rissoles and pastry for meat pies.

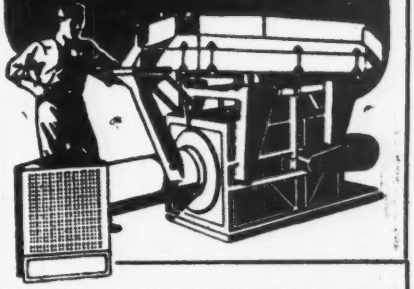
The package design, attractive from all angles, should help to introduce the product when it goes into national distribution soon.

No More $TONE$ in Your Bottle-Neck!

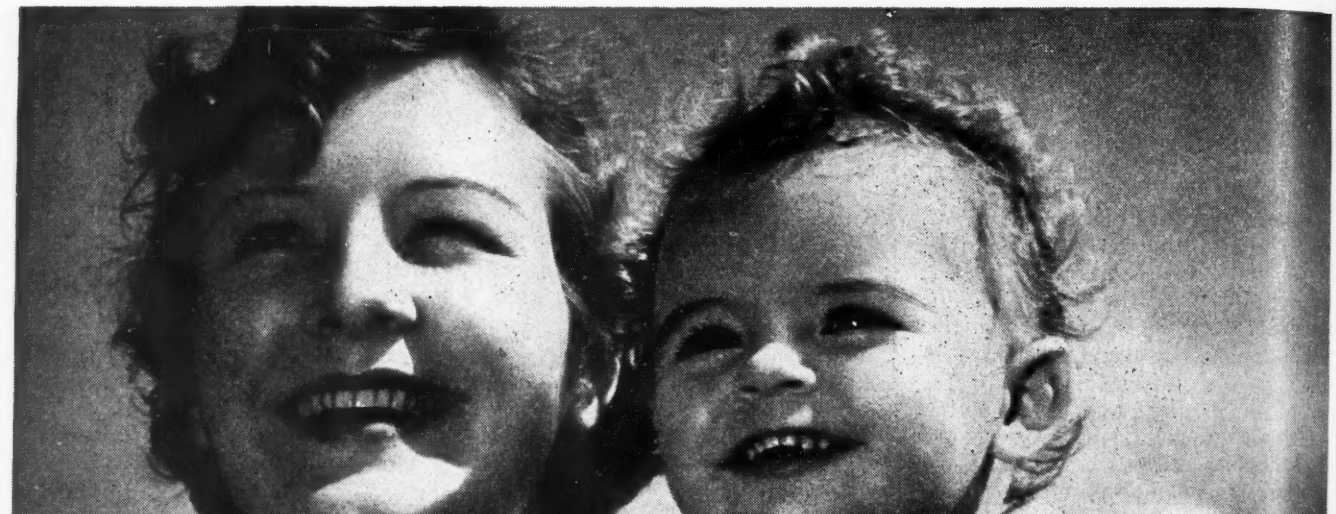
• Now, with critical war shortage of labor, streamline STONING in your mill. Removing stones has always been slow, laborious and costly out of proportion to other steps in processing cereals, soy beans, and other dry foods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic as well as magnetic metals, and all other hard, dangerous contaminations from cereals, soybeans, and other beans, and other food products with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour.

Write for Bulletin FI-1245

SS&S AIR-FLOAT STONER



SUTTON, STEELE & STEELE, INC.
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign—Separations Engineering, Ltd., 133 Bush House, Aldwych, London



SHE EXPECTS MORE FOODS TO BE VITAMIN ENRICHED

Taste will probably always be the largest single factor in determining the sale of a food. BUT that is no longer the whole story!

Housewives who have been studying nutrition, and men returning from the Services, have *experienced* the benefits of *improved* nutrition.

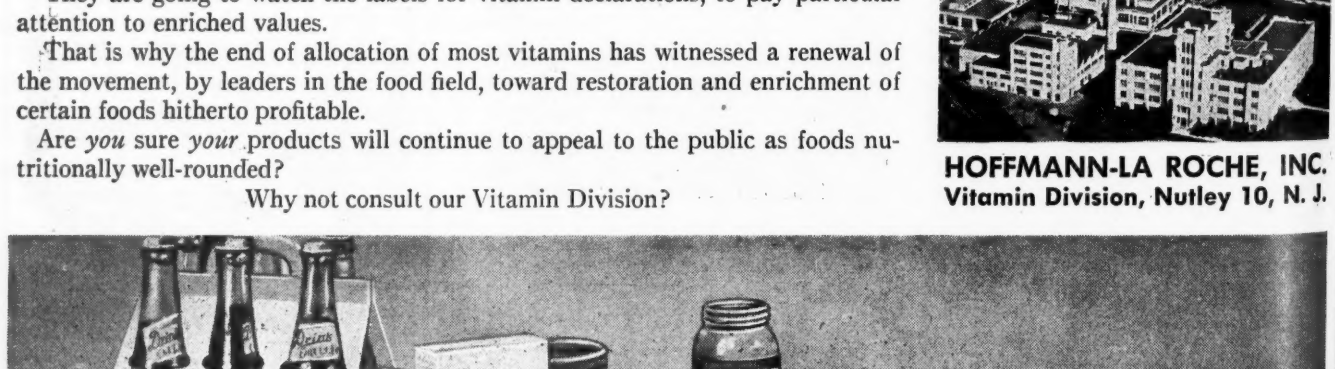
They are going to watch the labels for vitamin declarations, to pay particular attention to enriched values.

That is why the end of allocation of most vitamins has witnessed a renewal of the movement, by leaders in the food field, toward restoration and enrichment of certain foods hitherto profitable.

Are *you* sure *your* products will continue to appeal to the public as foods nutritionally well-rounded?

Why not consult our Vitamin Division?

HOFFMANN-LA ROCHE, INC.
Vitamin Division, Nutley 10, N. J.



FOOD INDUSTRY NEWS

GENERAL

Research Problems Discussed At Annual Meeting of GMA

Management's problems on labor and wages, frozen foods, and public relations are also under convention spotlight

THE food industry is devoting approximately $24,000,000 annually to research according to estimates made by W. C. Dunn, general counsel for the association, who reported on this phase of the industry, at the 37th annual meeting of the Grocery Manufacturers of America, in New York, November 7 and 8. A budget of from 0.1 to 1.1 percent, averaging 0.43 percent, was reported by seven firms doing a business of over $100,000,000 a year. Because of a scarcity of chemists and other research workers, Mr. Dunn said, many firms report that they are unable to plan satisfactorily for an expanded research program, yet all of them expect a research expansion.

Leo M. Wolman, director, National Bureau of Economic Research, Inc., pointed out that management is being forced to make important decisions, particularly on the wage question, during this period of transition from a non-commercial back to a commercial market. The labor unions are "asserting" that a rise in prices need not accompany wage increases, because they are smart enough to know that their demands would be less popular if higher prices were recognized to be a direct result. But where else will the money come from, Mr. Wolman asked. There has been a marked decline in employee efficiency, during the war, so there is no room there to add wage increases on top of those made during the war.

Carl Dipman, editor, *Progressive Grocer*, deflated some of the fantastic predictions that are being made on frozen foods. He expects that stores will sell about 8 to 10 percent of their volume as frozen foods, in the postwar years. This is in contrast to their present volume of around 3 to 5 percent of sales.

W. Howard Chase, public relations director, General Foods, defined public relations as a means "to provide reasons for people to think of us as their friends." People, as consumers, he said, may be satisfied with our product, but people, as citizens may be perfectly willing to vote us out of existence.

A. C. Nielsen, of the A. C. Nielsen Co., Chicago, made his eighth annual report on changes in distribution. The most important figure, on which he reported, was the household inventory on canned foods in 8,002,193 homes, and given in the following table:

	Home Canned (Standard	Commercial Pack Cases)
Dec. 21, '43	30,138	5,016
April 15, '44	16,646	4,388
Oct. 15, '44	33,276	6,140
April 15, '45	16,678	4,523

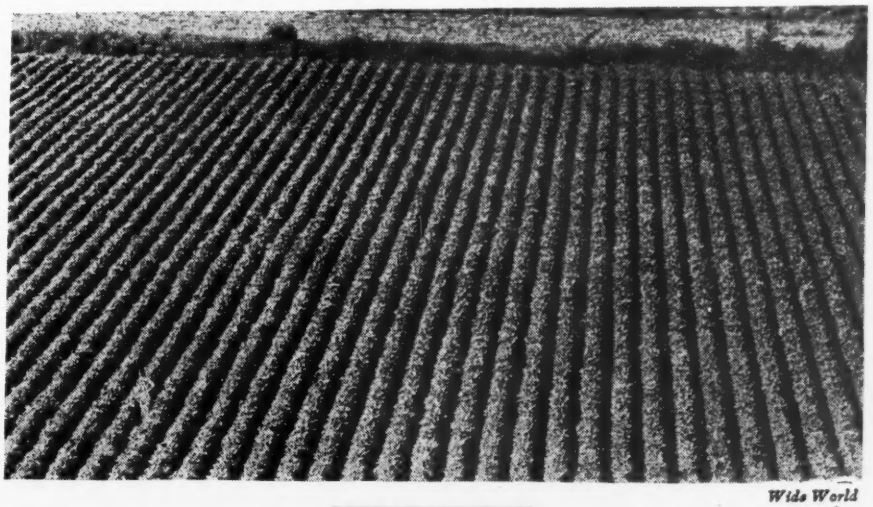
The eleventh annual GMA scientific award was presented to Dr. Paul B. Dunbar, U. S. Food and Drug Commissioner, who paid tribute to the members of his organization and its predecessor, for their work in making the American food supply the purest and most nutritious of any nation in the world.

FAO Setup to Advise UNO on Food Problems

A GREAT mass of recommendations for future consideration of the Food and Agriculture Organization came out of the Quebec conference, the first session of FAO. Generally speaking, the conclusion of the conference stressed the need for immediate action to relieve the acute suffering of people in the devastated areas where malnutrition and worse are the chronic condition. While FAO is not a charity organization, Commission A concluded that it could choose, from its priority projects, some that would alleviate suffering in many devastated countries.

Commission A, which was set up to determine upon a program and policy for FAO, established six committees to examine every possible field of activity in which FAO might have responsibility. These were: nutrition and food management, agriculture, forestry and forest products, fisheries, marketing and statistics. Programs suggested in the reports of these committees are ones that governments will undertake and which FAO will assist with investigations and advice.

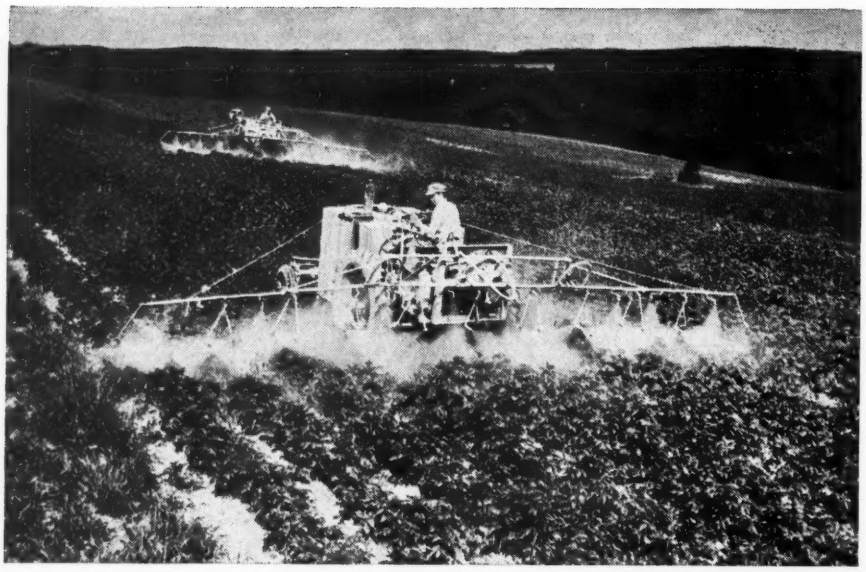
Emphasis was placed on the periodic reports of the member nations on progress made in the fields of FAO's activity, these reports and statistics to be the basis for studies and recommendations to help the programs of the member govern-



Wide World

LOTS OF SOYBEANS

Close to 800,000 acres are devoted to soybeans in North Carolina, where a sizable industry is growing up in processing to separate oil and meal. The oil is used as a vegetable fat, among other things, and the meal is fed to cattle and used in making plastics. This picture was taken in Lenoir County at harvest time, last October.



Authenticated News

PLENTY OF POTATOES

One of the country's largest crop of potatoes—estimated at 15 percent above the ten-year average—is now moving to market. This is part of 240 acres planted on the hillsides of Potter County, Pa., where they have been sprayed every eight days since coming through the ground. Twenty rows are sprayed at a time by the two sprayers shown here.

ments. It will be the duty of the Director-General to use the information in the reports to develop action along the lines agreed upon at the Hot Springs Conference and by the Interim Commission.

Sir John Boyd Orr, Scots nutritionist, was unanimously chosen for the post of Director General. Sir John is a member of Parliament and rector of the University of Glasgow. He said that FAO's first task is to get a world-wide picture of the food situation, including estimates of what should be produced and of the steps needed to raise production to that point.

It is the purpose of FAO, said Sir John, to so work with other organizations of the United Nations Council that it will be economically feasible for the world to consume enough food to maintain proper health standards. He predicted a sort of world-wide, ever-normal-granary to assure minimum prices to producers and a means of surplus distribution to people who need the surpluses.

Between annual conferences of the FAO executive committee, meetings will be held two or three times a year. Representatives from 15 nations comprising the executive committee met in Washington in early November, immediately following the Quebec organization conference attended by 36 of the 42 member nations. Gove Hambidge, who succeeded Howard Piquet as executive secretary of the Interim Commission, is acting as administrative officer for the executive committee. Headquarters of the FAO will be with the United Nations Organization.

Birdseye Introduces New Anhydrous Foods

ANHYDROUS fruits and vegetables were introduced to a group of food experts at a luncheon in the Waldorf-Astoria, November 13. Clarence Birdseye, inventor of this new quick drying process (see page 80) told the surprised gathering that the broccoli, carrots and mashed potatoes, as well as the apples in the apple tart, which they had just eaten, were processed rather than fresh.

It was also revealed at the luncheon that American Home Foods would produce and distribute anhydrous foods in the United States. President H. W. Roden of American Home Foods described the new process as the "greatest advance in the food field since Mr. Birdseye invented the quick freezing process."

Our Annual Index

FOR readers who wish to use their copies of FOOD INDUSTRIES for reference purposes, we have prepared a 12-page annual index of the articles and items which have appeared in the January through December issues of 1945. A copy of this index may be obtained free of charge by writing to: Editorial Department, FOOD INDUSTRIES, 330 West 42nd St., New York 18, N. Y. —The Editors.

Doubt Coffee Subsidy As a Price Solution

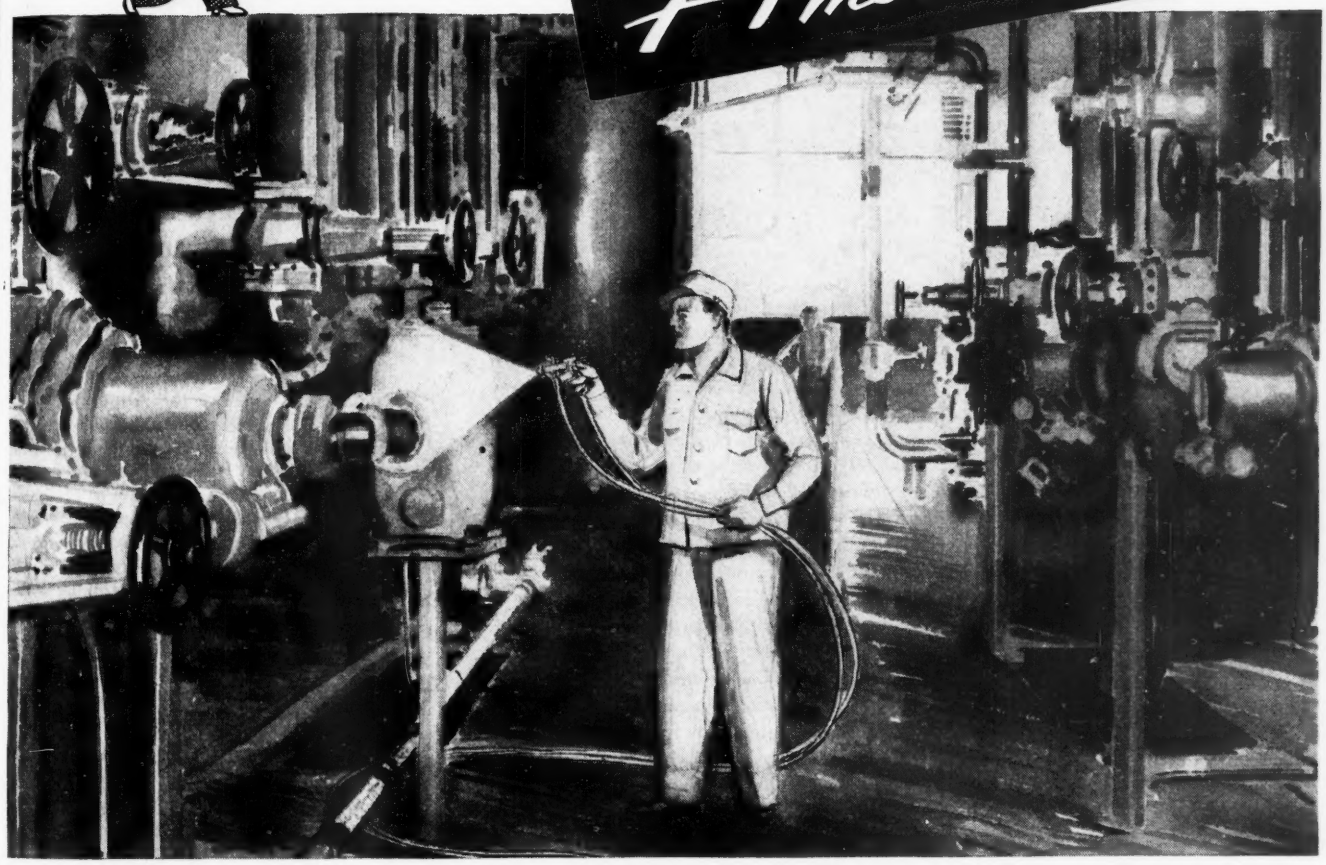
THE 3-cent subsidy granted by the U. S. government last month on coffee imports is a dubious solution to the long controversy over coffee price ceilings, in the opinion of most importers and roasters. Industry representatives were not consulted, according to the National Coffee Association, which is adopting a crossed fingers policy while going along with the plan, hoping for the best. No method for paying the subsidy was indicated in the original announcement, except that it was to extend through a six months period from November 19 to March 31, 1946, that it would be paid on 6,000,000 bags shipped from producing countries, that the importers would participate in these imports in the same ratio as under WFO 63, and that after March 31, the purchase ceiling would return to the previous levels.

This action, taken through Stabilization Director John C. Collet, follows a long series of refusals by OPA to raise coffee ceilings—frozen at Dec. 8, 1941, prices—in the face of urgent requests by both producers and importers. OPA's stock answer had always been to point to the huge imports at the current ceiling prices. When Great Britain and several other European countries recently tried to buy 1,000,000 bags at U. S. ceilings, the producers turned thumbs down, although large deliveries were then being made to the U. S. OPA could not ignore such evidence that there must be more to coffee than reached the cup.

It has been no trade secret that coffee importers, caught in the squeeze between the prices demanded in the coffee producing countries and U. S. ceilings, have had to submit to upgrading, and even upweighing in order to continue their supply. The importer, who protested that a grade 4 shipment proved on inspection to be a grade 6 or 7 and insisted on paying at the latter ceiling, would be likely to find his supplier unable to make further shipments. This chaotic condition became a major headache for the roasters, who had quality standards to maintain. And it grew worse as the exporting countries became more and more confirmed in their refusal to accede to price dictation by a U. S. government agency. A refusal that was prompted by their own difficulties with rising costs of production.

Perhaps in the hope of pointing

Corrosion— A COSTLY BURDEN, CAN BE PREVENTED BY Amercoat



No longer need industry carry the burden of waste, wear, maintenance or premature replacement due to the inroads of corrosion. Amercoat Plastic Coatings stop corrosion before it starts. Applied cold, by brush or spray, to machinery, floors, walls, tanks, and other food processing facilities, it acts as a barrier to the corrosive action of moisture, salts, acids and alkalies. It also gives positive protection against food contamination caused by the products of corrosion.

Amercoat is tasteless, odorless, chemically inert. It may be used as an interior lining or an exterior coating. It dries quickly and requires no baking.

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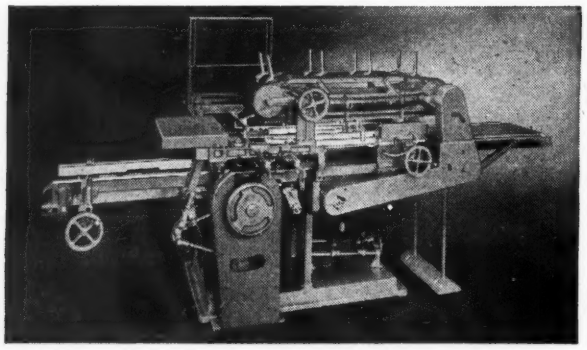

Neater, tighter wrapping for frozen foods

WITH THE NEW MODEL FA

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This completely modern wrapping machine turns out as many as 90 wrapped packages per minute, with only one operator in attendance. And it produces a neat, tight wrap that affords utmost protection to the product and greatly enhances the appearance of the package.

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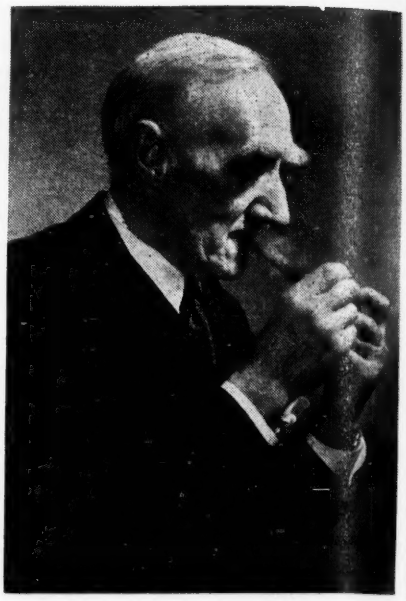

FAO HEAD

Sir John Boyd Orr, the newly elected director-general of FAO, is known to favor an immediate increase in world production of cereal grains as a first step toward providing an adequate nutritional diet for all people in all lands. He further proposes a world-wide increase in the production of dairy and poultry products together with other high quality foods to provide a more balanced diet. Sir John is now at his home in Scotland, where he will spend the holidays, returning to this country early in the New Year. His headquarters will be in Washington until the United Nations select a "world capital."

up the issue, Brazil decided to pay a 3-cent subsidy to its growers, beginning June, 1945. This, however, could not be a lasting measure, nor one that satisfied anyone, since it amounted to that country's subsidation of the U. S. consumer. But drastic action of one sort or another has dotted Brazil's coffee history over the past 25 years.

As the world's leading coffee producing country—they produced over 55 percent of U. S. coffee imports in 1944—Brazil has naturally dominated the field. From 1921 to 1937, they levied a high export tax in an effort to maintain high prices, buying and burning approximately 1,000,000 bags a year during that period. In November, 1937, this tax was drastically reduced and all export restrictions terminated. As a result, Brazil's exports increased, during 1938 and 1939, while the exports of the other coffee countries showed little or no reduction. This was probably due to an increase in consumption, plus the probability that European countries were already stocking up in anticipation of war.

For a time, the war threatened to bring about a collapse of the

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Co-ordinating research with manufacturing, Solar developed the above motion picture equipment to record entire welding operations under controlled conditions.

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Very truly yours,
JACOB RUPPERT

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George E. Ruppert,
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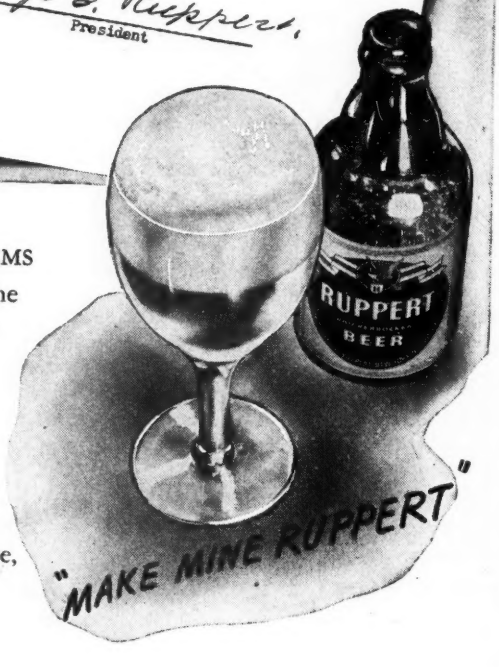

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industry in Latin-America. With European exports cut off, prices dropped to historic lows in the New York spot market in mid-1940. The situation was saved by adoption of the Inter-American Coffee Agreement, in November, 1940, which restricted exports from each producing country by a quota based on the previous five-year average.

Except for the period of rationing, immediately following the U. S. entry into the war, brought on by lack of shipping space, this agreement and frozen prices had relatively smooth sailing until rise in living costs and equipment began to climb above the permitted ceilings.

With the European markets reopening and OPA threatening to crack down on violations, imports dropped to the point where only 300,000 bags were purchased during October of this year, as against the yearly consumption of over 18,000,000 bags. Thus forced to some kind of action, the government chose to grant the subsidy, which it is estimated will cost the taxpayers about $24,000,000. This, it was indicated, was preferred to a rise in ceiling prices as coffee is an important commodity in the cost of living index. Not concerned with the index, the coffee industry has yet to be shown that their sought after 5 cents a pound rise in ceilings would make any appreciable difference to the U. S. food buyer.

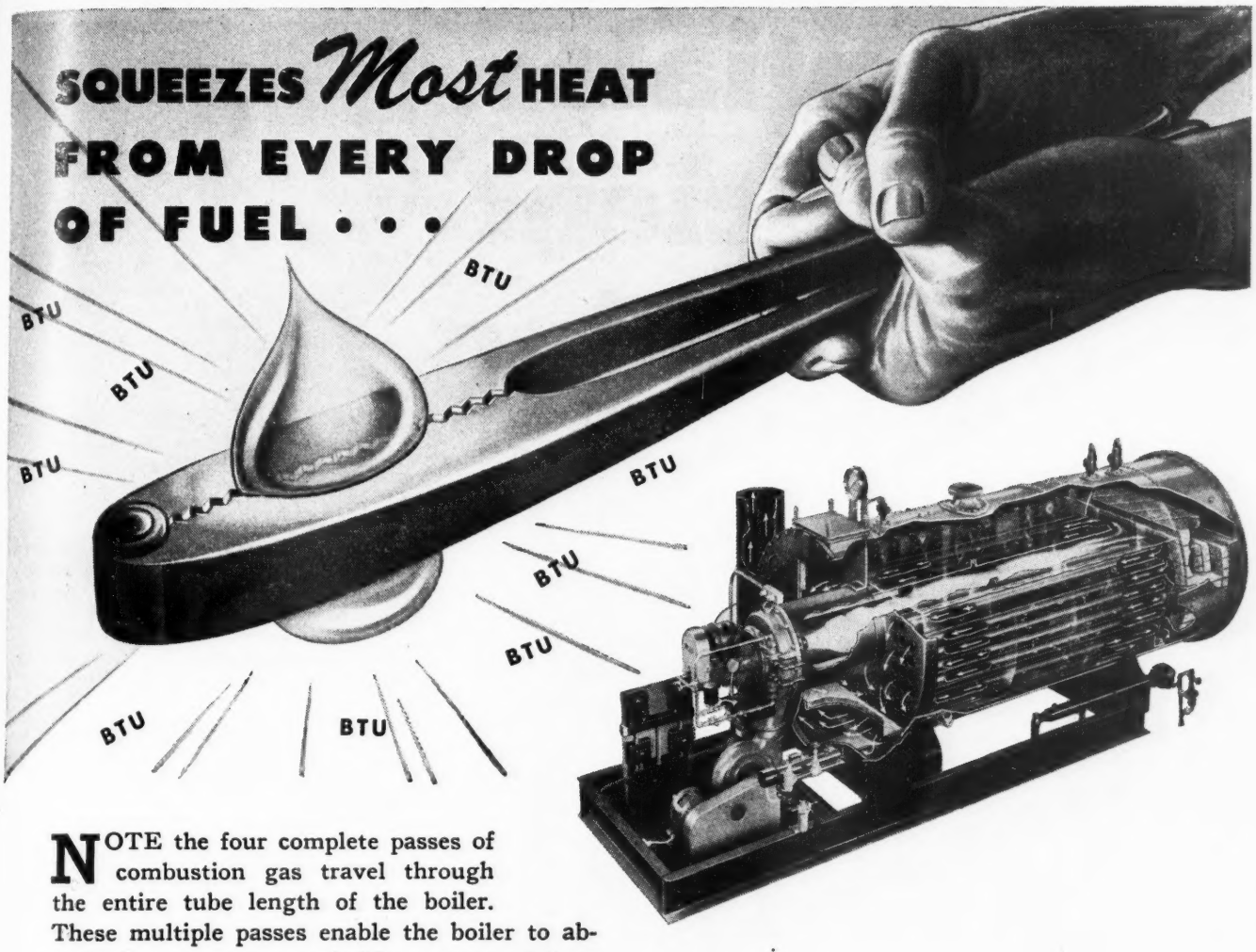
Earn and Learn Plan Begun on West Coast

To provide training for careers in food processing and related industries, an earn-while-you-learn plan has been instituted at the College of the Pacific, Stockton, Calif., sponsored by the Food Processors Foundation, an organization recently created by a group of canneries, frozen food plants and allied industries in northern California.

Patterned after programs in several well-known eastern colleges, the course in which students are allowed to alternate terms of study with periods of employment is the first to be offered by a Pacific Coast college.

The plan of study provides students with practical illustration to the technical, business and scientific subjects which they study in college, whether or not they expect to become laboratory workers cost accountants, office managers, salesmen or other types of employes in food processing and related industries. The three major fields offered

SQUEEZES *Most* HEAT FROM EVERY DROP OF FUEL • • •



NOTE the four complete passes of combustion gas travel through the entire tube length of the boiler. These multiple passes enable the boiler to absorb the greatest practicable amount of heat from the fuel burned.

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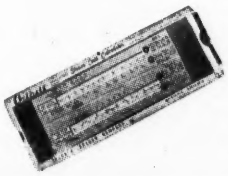

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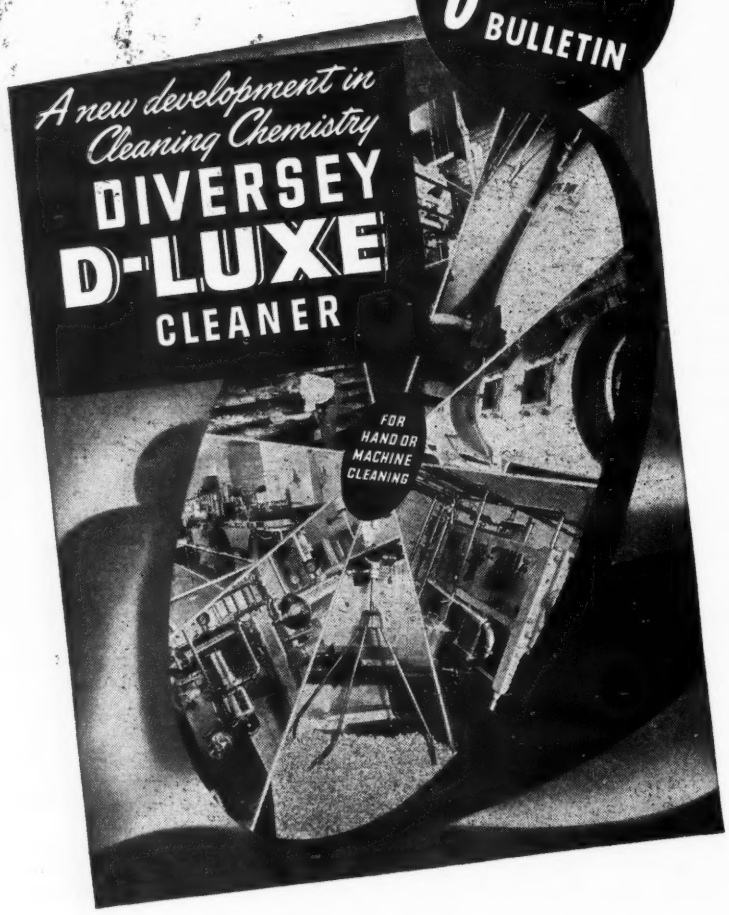

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ANHYDROUS FOODS
Equal amounts of raw and anhydrous riced potatoes are shown here. The new process recently announced by Clarence Birdseye has been taken over by American Home Foods, where the quick dried, flavor retained vegetables and fruits will be produced and distributed.

in the program are science (principally chemistry and bacteriology), business administration and economics.

In addition to the new training plan, the Food Processors Foundation is establishing, at the college, a technical library and a number of specialized short courses for regular industry members. A special motion picture on the various food processing operations is being prepared for training purposes.

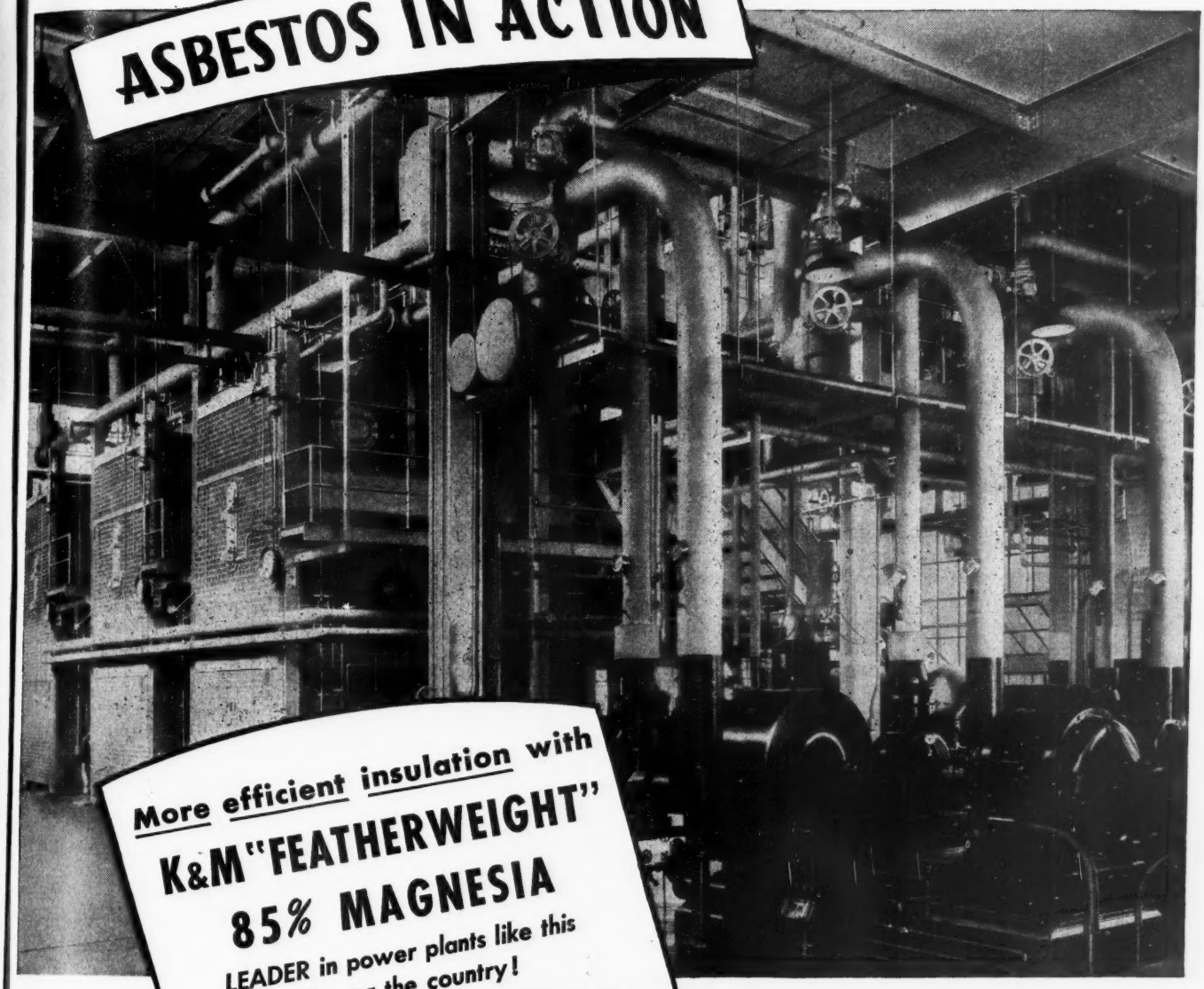
Louis B. Howard Named BAIC Assistant Chief

LATE in November Dr. Louis B. Howard assumed his duties as assistant chief of the Bureau of Agriculture and Industrial Chemistry with his station in Washington. In association with the chief and two other assistant chiefs he will participate in policy making and the staff administration of the four Regional Research Laboratories of the Bureau.

Col. Harry P. Newton returns to the Southern Laboratory as assistant director, with the extra responsibility of acting director because of the recent death of D. F. J. Lynch.

The four Regional Laboratories are confronted with increasing responsibility in their plans to provide food processing and nonfood research to encourage greater industrialization of agricultural surplus materials. Present investigations are necessarily planned for the industries of 1950 and later, it

ASBESTOS IN ACTION



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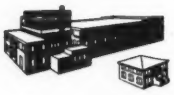

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is explained, because of the inevitable lag between a research idea and a profit-making industry that may result.

Food Economics Course Is Offered at Cornell

A NEW course in food economics is being offered to students in the School of Nutrition at Cornell University for the first time this fall. Dr. L. A. Maynard, director of the school, says it is designed especially for students in the School of Nutrition and will deal with the economic aspects of food production and distribution, giving attention to such topics as the history of the world's food problem, the factors which limit food production, the possibilities of expanding food production, income and its effect on food consumption and the population problem as related to food.

"The Food Economics course," he continued, "was organized in recognition of the fact that when discoveries of nutrition laboratories face the outside world, many economic considerations influence their application to the problem of improving the human diet."

PROCESSING

Meat Packers Turn to Reconversion Problems

INDUSTRY-WIDE concern over present day problems in public relations, governmental relations, labor-management relations and problems of distribution and reconversion, was voiced at the meeting of the American Meat Institute, in Chicago.

Dr. Wesley Hardenbergh, President of the American Meat Institute, stated that the most important job of all is to reconvert our own thinking. He questioned whether the meat packers, as an industry or as individuals, were ready to go back to normal methods of operations. Government regulations were cited to be still one of the problems in the meat packing industry. He feels that the meat packers should be slow to urge complete removal of governmental price controls from meat until supplies are in much better balance than they are today. Dr. Hardenbergh thinks there are other governmental controls which will remain, and that in the years to come, we shall have far more regulations than before the war.

In a discussion of the labor-

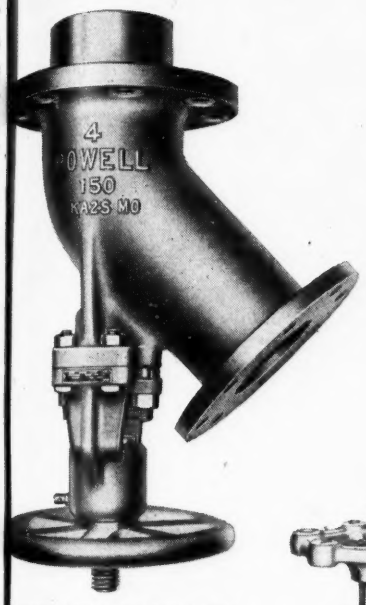
There's a POWELL VALVE for every Food Processing Service

To meet the exacting requirements of the Food Industries for flow control equipment that will not cause contamination in the end products, Powell has developed a complete line of valves—Globe, Angle, Gate, Y, Check, Relief, Flush Bottom Tank, etc.—made of every material (pure metals and special alloys) necessary to resist every known kind of corrosive action encountered in the processing of foodstuffs today.

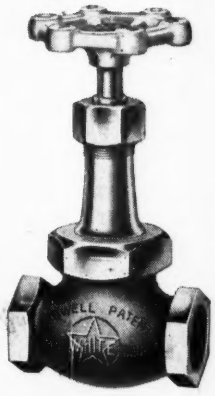
To satisfy all the other flow control requirements of the modern food processing plant, Powell makes a complete line of Bronze, Iron and Steel Valves of every necessary type and pressure.

The Wm. Powell Co., Cincinnati 22, Ohio

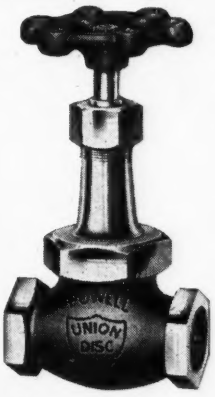
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES



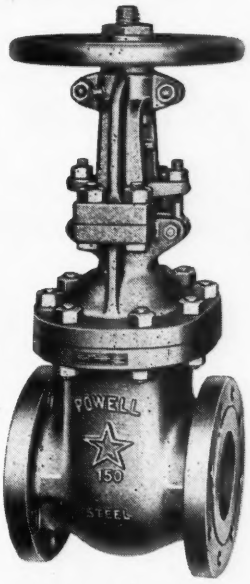
-pound Stainless Steel Flush tom Tank Valve, for attaching metal tanks and autoclaves. In design, the disc rises into the k to open the valve.



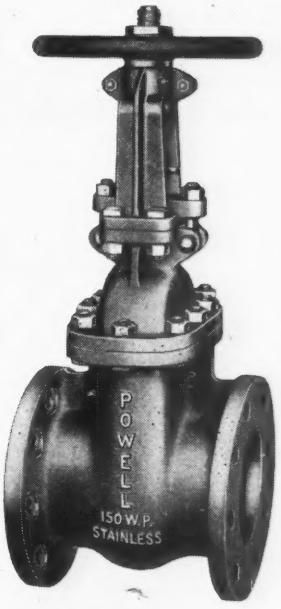
200-pound Bronze Globe Valve with regrindable, renewable seat and disc.



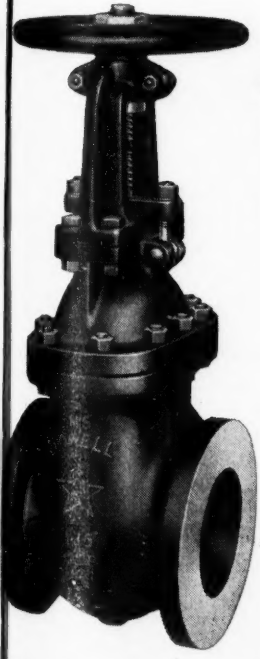
150-pound Bronze Globe Valve with Composition Disc.



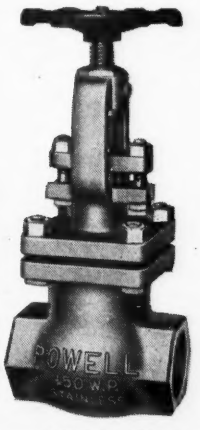
Class 150-pound Cast Steel O. S. & Y. Gate Valve.



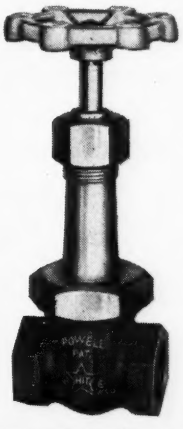
150-pound Stainless Steel O. S. & Y. Gate Valve.



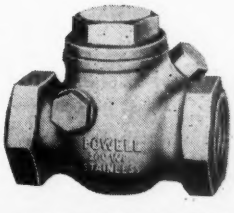
25-pound Iron Body Bronze ounted or All Iron O. S. Y. Gate Valve.



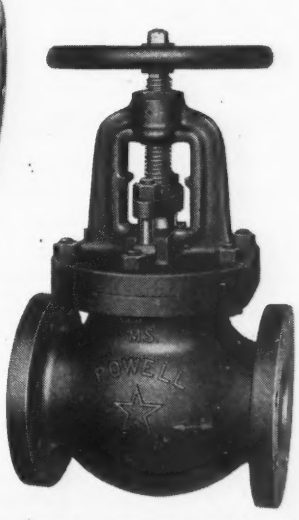
150-pound Stainless Steel O. S. & Y. Gate Valve.



200-pound Bronze Gate Valve with renewable disc.



200-pound Stainless Steel Swing Check Valve.



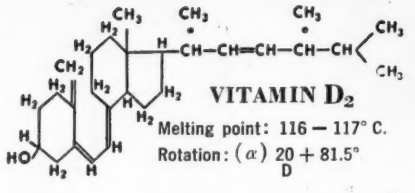
125-pound Iron Body Bronze Mounted or All Iron O. S. & Y. Globe Valve.

POWELL VALVES

Winthrop ANNOUNCES New Low Prices on—

PURE CRYSTALLINE Vitamin D_2

★ (CALCIFEROL)



Write For Details and New Price Schedule

Winthrop's synthetic vitamin D_2 (Calciferol) is free from lumisterol, toxisterol, suprasterol, and other by-products of irradiation. It never varies in antirachitic potency.

OTHER WINTHROP PURE SYNTHETIC VITAMINS:

- **TRIDEE**—Winthrop's Brand of vitamin D_3 in Corn Oil
- **VITAMIN B_1** (Thiamine Hydrochloride)
- **VITAMIN B_2** (Riboflavin)
- **NIACINAMIDE**
- **VITAMIN B_6** (Pyridoxine Hydrochloride)
- **CALCIUM PANTOTHENATE**
- **VITAMIN C** (Ascorbic Acid)
- **d-ISO-ASCORBIC ACID . . .**
- **AMINO-ACIDS**
  Tryptophane
  Phenylalanine
  Methionine
- **"B-E-T-S"**—Winthrop's Brand of Bread-Enrichment Tablets
- **"VEXTRAM"**—Winthrop's Brand of Flour-Enrichment Mixture

POTENCIES AND PACKINGS:

Crystalline Form in vials of one, five, and ten grams.

Solution in Corn Oil: 1,000,000 U.S.P. Units per gram* packed as follows:

400 Standard Units	2,500 Standard Units
1,000 Standard Units	50,000 Standard Units

Also Solution in Corn Oil: 400,000 U.S.P. Units per gram packed as follows:

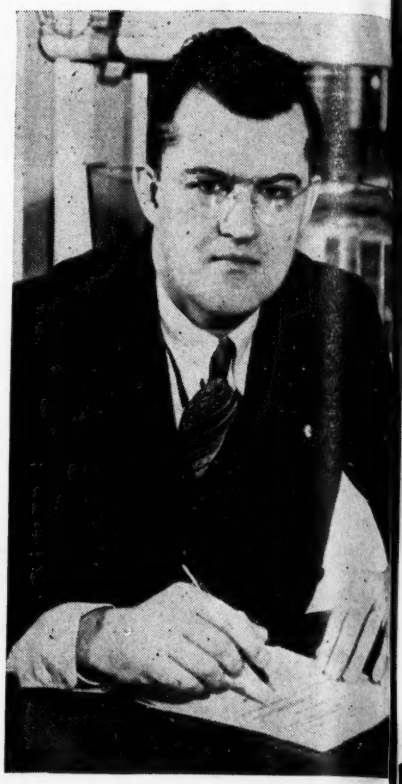
250 Standard Units	1,000 Standard Units
500 Standard Units	20,000 Standard Units

*Standard Unit=1,000,000 U. S. P. Units

WINTHROP

For prices and information address
Special Markets Division
WINTHROP CHEMICAL COMPANY, INC.
170 Varick Street, New York 13, N. Y.

★ Sole Manufacturer under U. S. Patent 1,902,785 granted to Winthrop Chemical Company, Inc.



ELIMINATES MOLD

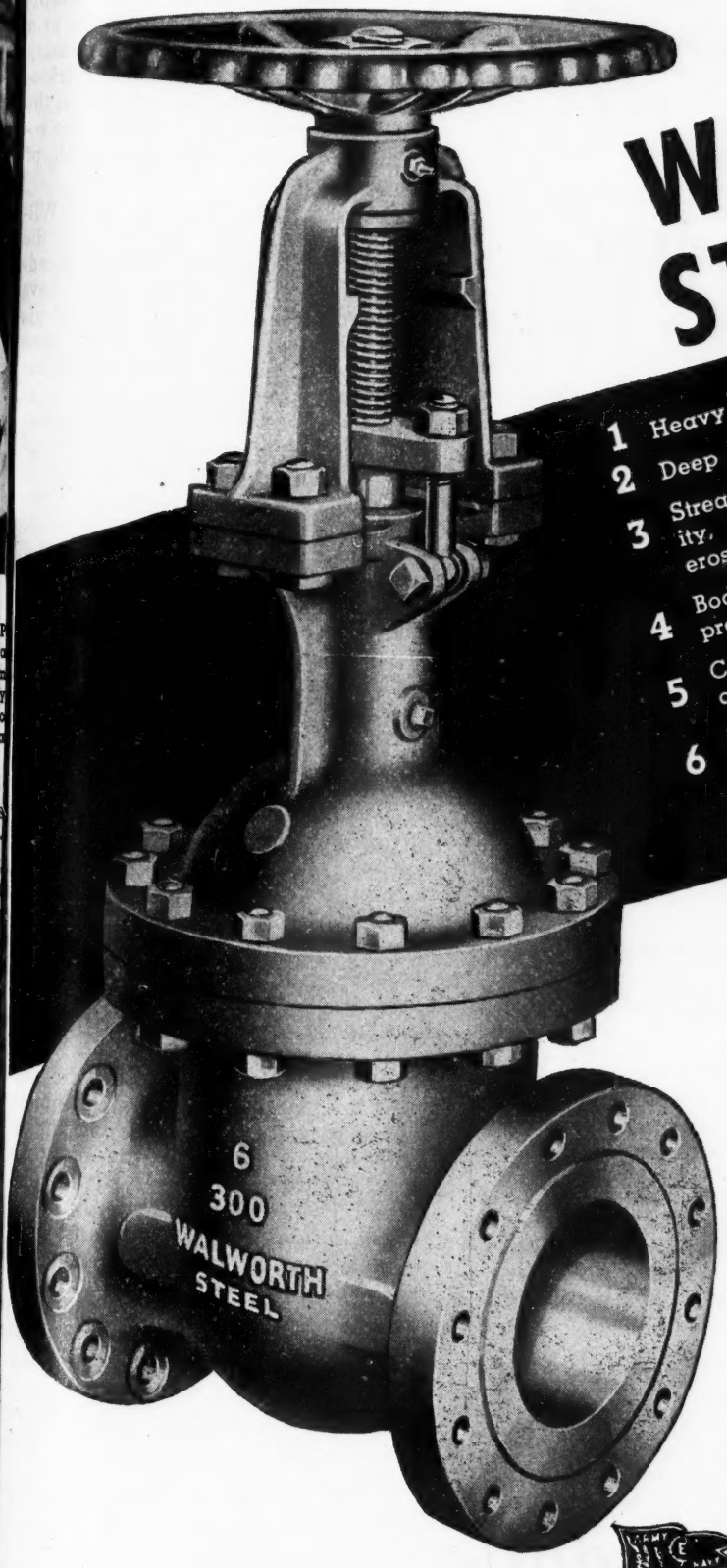
Dr. William H. Cathcart, head of the A&P baking laboratories, has discovered a method for eliminating mold spores from bread by "broadcasting" high frequency heat through the wrapped loaves. Bread so treated was found to be free of mold a month after baking.

management problems and factors involving wage increases and production costs, Louis Ruthenburg, President, Servel, Inc., stated that a few of the more intelligent union leaders seem to understand that real wages, wages that buy more goods, can only be increased by increased productive efficiency. He also emphasized that proposals to compensate workmen for the loss of overtime premium pay, high unemployment benefits under Federal aid and pressure for the guaranteed annual wage, or labor restrictions on its union members will not stimulate increased productive efficiency. In fact it will more likely decrease production per worker.

H. E. Reed, Director, Livestock Branch, Production and Marketing Administration, U. S. Dept. of Agriculture regards distribution as the outstanding problem in the meat field today. Normal distribution patterns are hard to maintain and the incentive needed to pull meat from surplus to deficit areas is not present. This is particularly true in regard to distribution of seasonal supplies.

Predictions were many in the field of packaged meats, fresh and frozen. E. W. Williams, Publishe

You get all these BIG features in WALWORTH STEEL VALVES



1 Heavy steel walls for extra strength and protection.

2 Deep stuffing boxes to eliminate costly leaks.

3 Streamlined ports to make possible a high velocity, non-turbulent flow, and reduces possible erosion.

4 Bodies and bonnets engineered to withstand pressure and minimize distortion.

5 Cast body guide rib faces, machined to insure accurate disc centering.

6 Exact design, metallurgy and construction of yoke nuts, bonnet bushings, gland followers, handwheels and other vital parts to assure better service for a longer period of time.

Is there any wonder that out in the field, where approval is based on performance under actual operating conditions, industry has put its O.K. on Walworth Steel Valves?

Tough . . . wear resistant . . . dependable, these valves are produced in gate and globe types, in sizes to cover practically every service requirement. They are excellent examples of Walworth leadership . . . leadership that has made the Walworth valves famous throughout the world.

Walworth Catalog 42 gives complete information regarding Steel Valves as well as the full line of Walworth valves and fittings in bronze and iron. Your copy may be obtained upon request. Whenever you need valves — whether steel, bronze or iron — remember Walworth for dependability, economy, and long service life.

14 AWARDS TO 4 PLANTS

WALWORTH
valves and fittings
60 EAST 42nd ST., NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

The man to look for

WHEN THE LID'S OFF!

THE lid's off *now* on new ideas in processing, in packaging, in equipment . . . in just about every phase of the food industry. That means a lot of changes in all kinds of operations. *Cleaning* included!

At a time like this . . . when expert advice is essential . . . the man to look for is your Wyandotte Representative. With a complete line of cleaners at his command, he is prepared to tackle every type of sanitation problem, in every type of plant . . . from canning to quick-freezing.

Need help on scouring utensils or washing containers? A few tips on speeding maintenance tasks? Or perhaps a safe method of germicidal protection? Your Wyandotte Representative is ready with ways and means to produce a *specialist's* results on all such jobs.

Why not get in touch with him today? His services may well save you money for many tomorrows.

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION
J. B. Ford Division
WYANDOTTE, MICHIGAN

Service Representatives in 88 Cities

of *Quick Frozen Foods* believes that the number of retail stores having frozen food cabinets will be doubled during 1946 from the figure today of approximately 35,000. He also believes that the acceptance of frozen meats depends upon the acceptance of frozen food products as a whole. Expansion in this industry depends a great deal upon distribution, and distribution hinges on the development of cabinets for the retail stores and also on the sale of home freezers.

Advantages given by Mr. Williams for frozen meats from the meat packer's distribution standpoint are: 1. the packer would have control over the distribution of his own products; he could brand each cut and reduce costs somewhat through greater offal recovery at the plant as well as weight reduction in shipping, 2. a greater variety of choice meats could be stocked at many warehouse points, 3. larger inventories would be possible without loss. Disadvantages include: 1, the task of converting "fresh-meat-minded" personnel into "frozen-meat-minded" men in sales departments of many meat packing plants, 2. the additional cost of operating the low-temperature cabinet and providing zero-degree protection to the meat from the plant to the store, and 3. converting buyers to the idea of purchasing uniform size cuts.

George W. Meek, President of Frozen Food Products, Inc., in connection with his discussion of equipment for frozen meats said there are at least six or eight new retail frozen-food cabinets to be placed on the market, but little attention is given, in the design of these cabinets, directly to the sale of frozen meats. Even in equipment offered for use in merchandising fresh packaged meat, the manufacturers have done very little pioneering. The cases are mostly minor adaptations of fresh fruit and vegetable display cases. Frozen meats should have individual attention given to display, packaging, and distribution. Mr. Meek feels, however, that packaged fresh meat, and in the years to come and to a lesser degree, pre-packaged frozen meat, will be sold largely from self-service cabinets in retail stores.

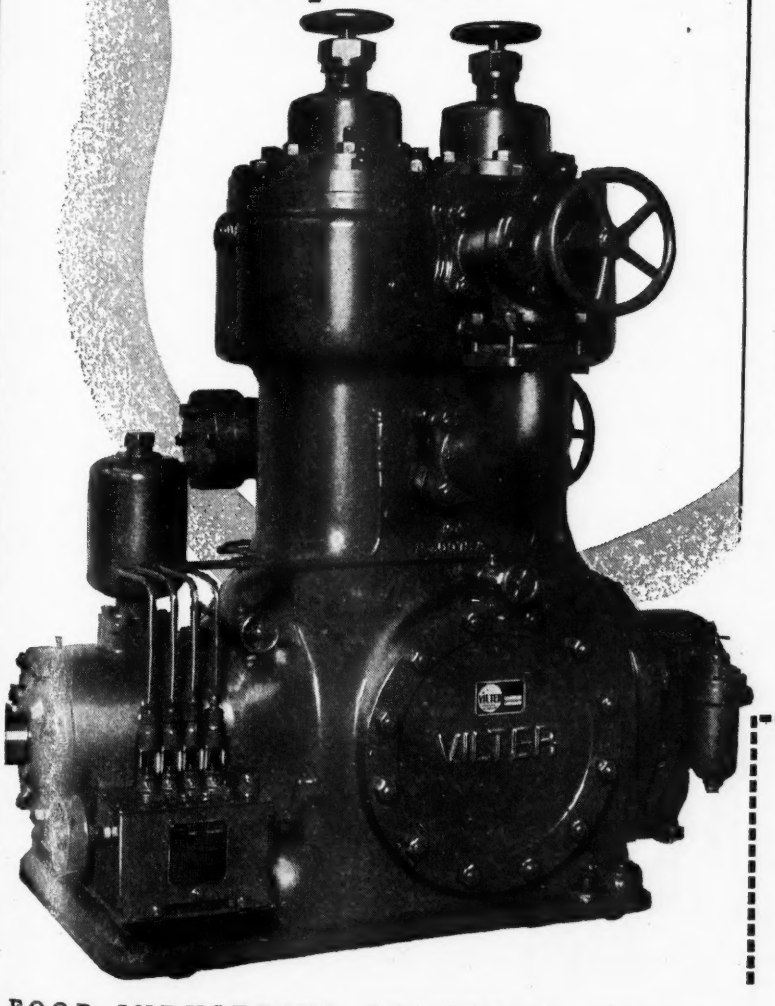
Officers elected at the meeting were: Chairman of the board—James H. McCall, vice-president of H. J. Allison & Co., Chattanooga, Tenn.; President—W. G. Hardenbergh reelected; Secretary-Treasurer—H. Harold Meyer, H. H. Meyer Packing Co., Cincinnati, Ohio, re-

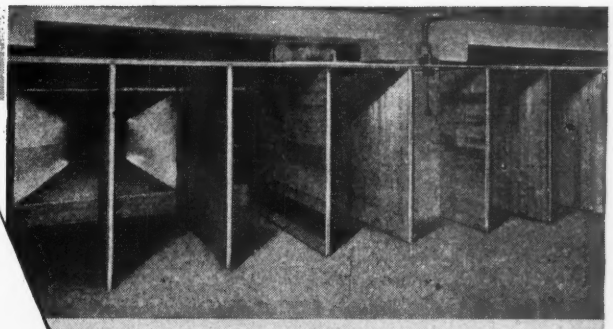
When you convert your refrigeration system for

Food Freezing

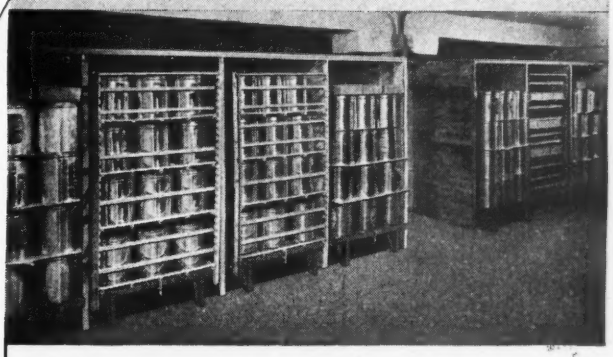
(or start a new plant from scratch)

...cut power costs and increase efficiency with this Vilter booster compressor





Vilter-designed, Vilter-equipped Frigid Blast Freezer Installation at Central Warehouse, St. Paul, Minnesota. Originally designed as a poultry freezer, used also for freezing meat, and liquid eggs in 30 lb. containers as illustrated below.



● For food freezing — and other low temperature work — a Vilter two-stage system offers two important advantages: First, a Vilter Booster Compressor, combined with your present equipment will cut power costs 10% to 20% as compared to a simple compression system. Second, under the same conditions, the new two-stage combination will deliver a longer useful life than the original single-stage installation.

Whether the problem is one of converting your present set-up into a food-freezer, or the designing of an entirely new installation, Vilter experience can help you. Vilter offers you the sound engineering and quality construction which, since 1867, have made a Vilter installation something to be proud of.

Ask for Bulletin 935 on the Vilter Booster Compressor, and write us fully regarding your freezing requirements; state whether you are interested in batch or continuous freezing, and the amount to be handled in a given period of time. Address the nearest Vilter branch office, distributor, or *The Vilter Manufacturing Co., Dept. L-12, Milwaukee 7, Wis.*

Branch offices and distributors in principal cities.

M-4

Vilter

Air Conditioning • Refrigeration

[Tear out coupon and mail today]

THE VILTER MANUFACTURING COMPANY
Dept. L-15, Milwaukee 7, Wisconsin

Please send Bulletin 935 on Vilter Booster Compressor for
☐ converting my present plant ☐ new plant.

Product to be frozen.....
Amount.....per.....hours.

Name.....

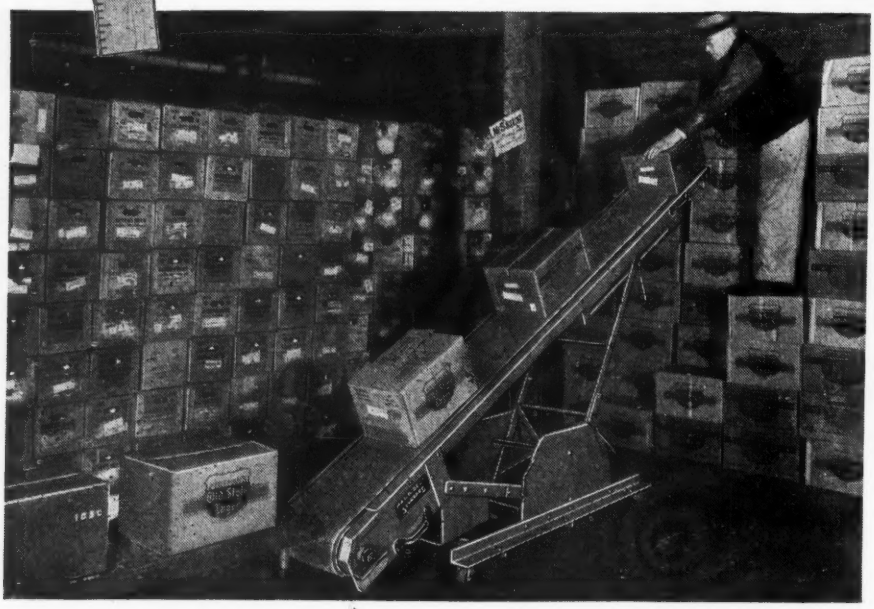
Position.....

Company.....

Address.....

City.....(.....) State.....

MAKES EVERY INCH OF STORAGE SPACE HANDY . . .



IT'S THE HANDIBELT in *Action*

Hard-to-get-at spaces are easily reached with the Handibelt — the all purpose incline, decline or horizontal portable belt conveyor. Its design allows the carrier belt to be horizontal at any height from 18 inches to 42 inches. It can be used as a piler elevating from 10 inches to 6 feet 3 inches or from 30 inches to 7 feet 6 inches, or any angle or degree between those extremes. Either end may be raised or lowered.

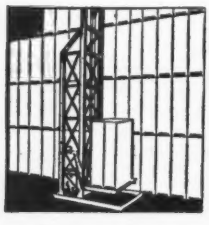
The Handibelt handles boxes, cartons, crates, bags, and other packages up to 100 lbs. The rubber covered belt is free of side rails—commodities wider than 14 inches may be carried.

This flexible unit may be used as a piler, a horizontal conveyor, a connecting link between other conveyors, as a feeder conveyor. Any number of Handibelts can be placed in line to form a continuous conveyor to reach remote spaces.

Weighs less than 500 lbs. — easily wheeled about by one person. Equipped with ⅓ hp. motor — plug it into any ordinary lighting circuit.

Get complete information today— write for Handibelt Bulletin No. FI-125

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities



TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

New Plant Rising for China Food Producers

THE Great China Food Products, Chicago, is building a $350,000 combination one- and two-story plant for the manufacture of Chinese food products. These products are bean sprouts, chop suey, chop suey vegetables, chop suey sauce, chow mein noodles, chow mein dinner, bamboo shoots, water chestnuts, bead molasses, egg noodles, and soy bean curd. They are packed in both glass and tin and are marketed through brokers.

The plant has a corner frontage of 400 and 126 ft., will be of modernistic design, and will contain 55,000 sq. ft. of floor space. It is scheduled for occupancy in February.

The Great China Food Products began operation in 1937. It is owned and operated by Chinese. During the war the major part of its production went to the armed forces.

Surplus Food Plants Studied by Government

GOVERNMENT-OWNED food plants and facilities are to be the subject of intensive study within the Department of Agriculture for the next few months. Senate Resolution 176, agreed to in October, calls for an immediate study by the Secretary of Agriculture "to determine the advisability of continuing the operation of all Federally owned plants and facilities which were used during the war for the exclusive processing of agricultural commodities and forest products or for manufacturing nitrates for fertilizer and to report to the Congress his findings and recommendations based thereon."

A time limit of July 1, 1946, was set by the Senate. In the meantime, all other Federal agencies having jurisdiction over such plants are "requested to refrain from leasing, selling, or otherwise disposing of" them without the approval of the Secretary of Agriculture, and are requested to continue the operation "provided the products from such operation can be effectively used by the Federal government, or provided the plants can be used to process surplus of perishable crops."

About two dozen skim milk drying plants are involved, both spray and roller dryers, with aggregate annual capacity of approximately 90,000,000 lb.

A dozen vegetable dehydration plants and facilities, mostly for po-

It's amazing...

WHAT A GOOD PACKAGE CAN DO FOR YOU

1.

It can attract attention to itself

2.

—get the product off to a good start

3.

—keep it in perfect condition before use

4.

—thus helping to insure repeat sales

ENTER . . . "FLAV-O-TAINER"

This cooperative package—*a patented duplex bag heat-sealed on all seams*—is helping many a manufacturer to create brand preference for his product. It's a *smart* package, with lots of eye-appeal, particularly when developed by Royal designers, but even more important to the success of the product—*it provides dependable protection against air, moisture, grease and odors.*

FLAV-O-TAINER will soon be available in the following Royalflex films: Selloflex (Cellophane laminated to itself or to other material); Lumiflex (aluminum foil laminated to other material); Plioflex (Pliofilm laminated to itself or to other material); Duoflex (moisture-proof coated glassine laminated to itself).

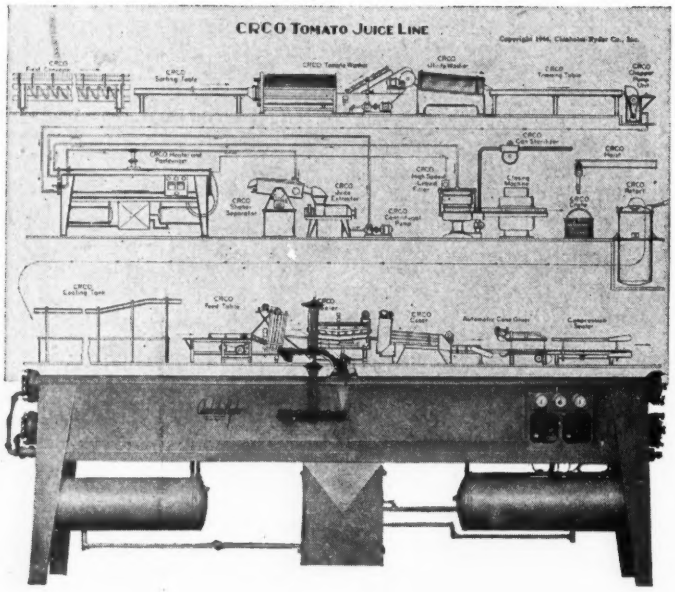
THE COOPERATIVE PACKAGE "FLAV-O-TAINER" HELPS SELL YOUR PRODUCT

THOMAS M. ROYAL & COMPANY • *Philadelphia 20*

BOSTON • CHICAGO • SAN FRANCISCO • BEAUMONT • ATLANTA • PITTSBURGH • NEW ORLEANS
DENVER • SEATTLE • NEW YORK • ST. LOUIS • DAYTON • DETROIT • SYRACUSE • BRYN MAWR

OVER HALF A CENTURY
OF KNOWING HOW
1890 – 1945

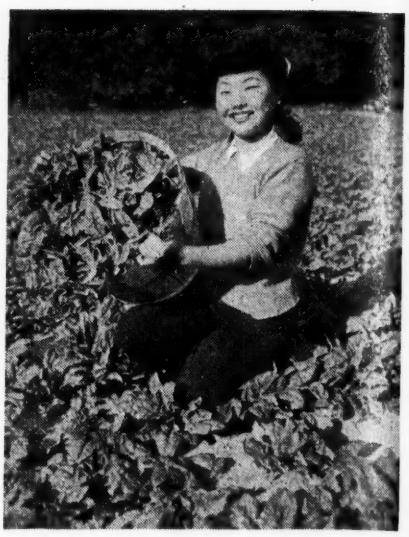
CRC CONFIDENCE
... born of experience



Better Pre-Heating the CRCO Way

CRCO-American Vacuum Steam Design Pre-Heaters insure full-flavored Juice in greater quantity at lowered labor and maintenance cost. They are faster, require less attention because they are entirely automatic and they heat evenly without danger of over-heating, burning-on or scorching. The thermostatic controls are quick, positive and always automatic. Available in single or double-tube models in any length for any desired capacity.

THE BEST OF Everything
CHISHOLM-RYDER
Niagara Falls, New York
FOR · THE · FOOD · PROCESSOR ·



Wide World

NIESI SPINACH

Among the Japanese-Americans uprooted from California, early in the war, was this young lady, who is part of a Niesi group drawing sustenance from 15,000 Seabrook Farms' acres in south Jersey. This spinach is to be shipped to the company's processing plant near Bridgeton.

tatoes and onions, were designed to produce over 35,000,000 lb. of product annually.

Sixteen raisin dehydration plants in California are government owned and have a capacity of over 20,000 tons of product per year.

Two citrus plants in Florida, a "converted rice" plant in Texas, and some storage facilities combine to bring the federal investment in food plants to about $13,000,000.

Utilization of three complete industrial alcohol plants, costing about $12,000,000, and some of the $35,000,000 worth of government-owned facilities at over 75 privately owned distilleries, may also contribute to future grain demand and by-product protein feed supply.

DDT Precautions Are Strongly Emphasized

USE of DDT as an insect powder, as a "residual" spray on walls and floors, and as a mist to kill flying insects should be encouraged in all food plants. But need of great care is repeatedly emphasized by Department of Agriculture and Food and Drug officials.

Important distinction must be made between residual spray methods which care for crawling insects and the aerosol method for mist formation to kill flying pests. It is believed wasteful to use the mist method when a crawling insect is attacked except when that method affords the only means for getting

Merchandising Tips—No. 7

Only Quality can truly reflect quality!

Do your products look their best for that all-important date with the consumer? Make sure the quality products you pack are seen and appreciated—with all their colorful eye and appetite appeal—send them to market in clear, clean inviting Anchorglass packages!

Shoppers everywhere have learned to associate glass packaging with top quality merchandise. There's a right combination of light, strong Anchorglass container and dependable Anchor Cap to help you take best advantage of this merchandising trend.

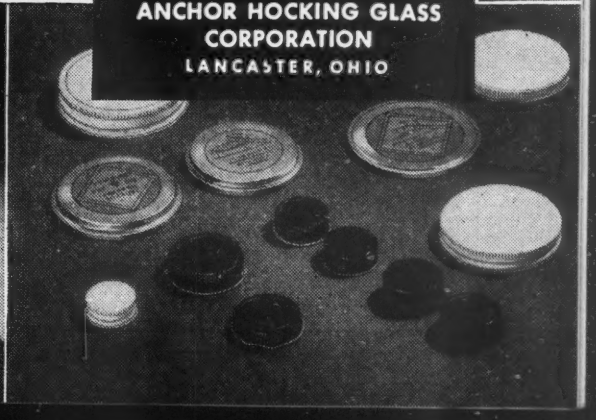
Let us help you plan your new package or improve the ones you have. Private glass show cases will emphasize and enhance the quality of your products—make them easy to use—and keep them pure and fresh to the last bit!

Write today for package engineering service.

Hear how Anchor Hocking is educating millions of your customers and retailers every week to the advantages of modern glass packaging—Tune in "Hobby Lobby" every Thursday evening, entire Coast-to-Coast Network, CBS.

Anchor
CONTAINERS and CAPS

PRODUCTS OF
ANCHOR HOCKING GLASS CORPORATION
LANCASTER, OHIO



don't let bacteria rob your quality!

play safe with LO-BAX*

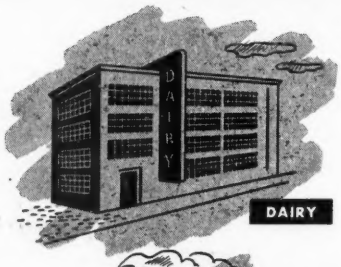
Bacteria lurk and breed in food and beverage plant equipment that isn't kept scrupulously clean and sanitized . . . and when bacteria count goes UP—quality comes down.

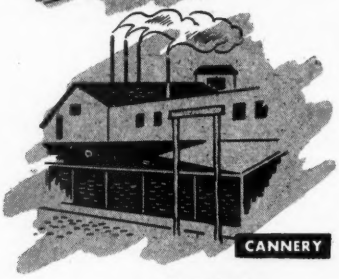
Lo-Bax, the concentrated, fast-killing chlorine bactericide helps prevent food spoilage, improves quality standards by rigidly controlling bacteria, keeping down mold and sanitizing all surfaces with which food or beverages come in contact.

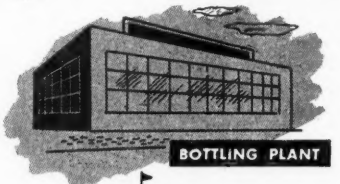
Simple and easy to handle—Lo-Bax kills bacteria almost instantly on contact . . . and at amazingly low cost. Dissolves quickly in water—hot or cold, hard or soft—to make clear chlorine-rinse solutions. Lo-Bax, with its 50% available chlorine, is dependable—retains its strength as packed in original container.

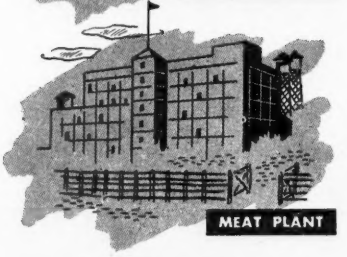
Play safe the Lo-Bax way the year round! Write for further helpful information on the use of this high-speed, versatile bactericide.

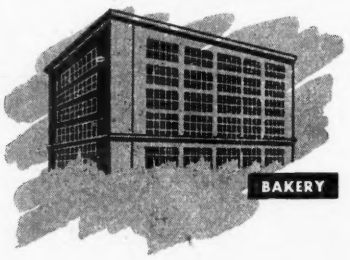
THE MATHIESON ALKALI WORKS (INC.)
60 East 42nd Street, New York 17, N. Y.











***LO-BAX**
50% AVAILABLE CHLORINE

LO-BAX SPECIAL — a superior chlorine bactericide in granular form — packed in 2½-lb. bottles, ½ doz. to the case; and in 14-oz. bottles, 1 doz. to the case.

LO-BAX POWDER — a highly efficient chlorine bactericide packed in 28-oz. bottles, 1 doz. to the case.

Mathieson
LO-BAX
CHLORINE BACTERICIDE

Lo-Bax • Super-Nufos • HTH-15 • Dry Ice • Carbonic Gas • Ammonia, Anhydrous & Aqua • Caustic Soda • Soda Ash • Bicarbonate of Soda • Liquid Chlorine • Chlorine Dioxide • PH-Plus • Synthetic Salt Cake • Sodium Chlorite Products • Sodium Methylate

the active element into narrow spaces that cannot well be reached by a dust gun or an ordinary household spray technic.

Food technologists must make certain that no residual DDT is left in a food beyond newly defined tolerance for such foods as unavoidably carry this material. F&DA has announced that it "will not take action against apples and pears containing not more than 7 milligrams of DDT per kilogram of fruit." But for the presence of the same quantity of material in other foods, for which this material is not properly and necessarily used, there is no such tolerance provided. Officials make the distinction that the tolerance on the two fruits means that a less toxic insecticide residue is permitted in order to make unnecessary any residue of arsenic, lead or cryolite, which are more toxic materials, which might otherwise be unavoidably in processed foods.

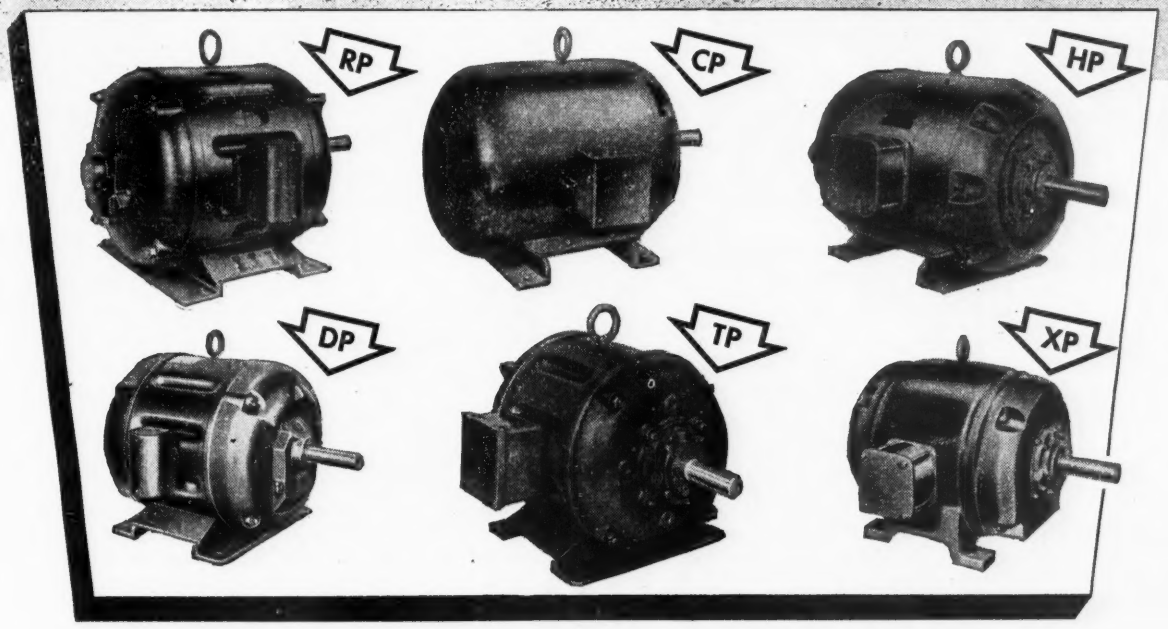
Those wishing to study F&DA policy on this can get the trade correspondence ruling 3-A which has been released recently.

Quartermaster Corps Specifications

The Quartermaster Corps has issued the following specifications. They are listed with the Chicago Quartermaster Depot number and date of issue.

Chocolate and chocolate flavored sirup, C. Q. D. No. 369, Mar. 23, 1945, Amendment 1, Sept. 7, 1945. Sweet Potatoes Canned in Sirup, C. Q. D. No. 380, Aug. 21, 1945, Superseding C. Q. D. Specification, Feb. 5, 1942. Packaging and Packing Assembly Ration Type C, C. Q. D. No. 183B, Apr. 12, 1945, Amendment 1, July 23, 1945. Canned Beef Stew, C. Q. D. No. 359A, Aug. 29, 1945, Superseding C. Q. D. No. 359, Mar. 14, 1945. Canned Ham Chunks, C. Q. D. No. 190B, Aug. 9, 1945, Superseding C. Q. D. No. 190A, Mar. 29, 1945. Canned Parboiled and Steam Roasted Beef, C. Q. D. No. 53A, Feb. 15, 1945, Amendment 1, Sept. 5, 1945. Dehydrated Soups, C. Q. D. No. 26E, June 22, 1945, Superseding C. Q. D. No. 26D, Sept. 1, 1944. Degerminated Corn Meal, C. Q. D. No. 381, July 24, 1945, Use in lieu of Federal Specification N-C-521, Mar. 31, 1931. Degerminated Hominy Grits, C. Q. D. No. 382, July 24, 1945, Used in lieu of Federal Specification N-H-521, Mar. 31, 1931. Breaking, Freezing Operating Standards for Egg Storage and Drying Plants, Technical Bulletin No. 2A, Dec. 12, 1944, Amendment 1, July 13, 1945. Canned Pork Sausage, C. Q. D. No. 98C, July 10, 1945, Superseding C. Q. D. No. 98B, July 3, 1944. General Specification for Packaging and Packing Cereal Subsistence Items for Overseas Shipment, C. Q. D. No. 160B, July 18, 1945, Superseding C. Q. D. No. 160A, July 12, 1944. Dehydrated Orange Juice, C. Q. D. No. 180A, June 15, 1945, Superseding C. Q. D. No. 180, May 22, 1944. Canned Chopped Pork and Eggs, C. Q. D. No. 376, July 27, 1945, Superseding C. Q. D. No. 20F, Type VIII. Canned Beef and Vegetables, C. Q. D. No. 315A, July 24, 1945, Superseding C. Q. D. No. 315, July 29, 1944. Labeling and Marking of Metal Cans for Subsistence Items, C. Q. D. No. 107A, Feb. 21, 1944, Amendment 3, Aug. 11, 1945. Superseding Amendment 2, Oct. 5, 1944. Chop Suey (Soy), Worcestershire and Kitchen Sauces, C. Q. D. No. 370, Apr. 24, 1945, Amendment 2, Aug. 8, 1945, Superseding Amendment 1, June 27, 1945.

Wagner offers a Complete Line of Motors for all Industrial Applications



Wagner motors (shown here in their electrical and mechanical variations) embody the latest developments in design. They are simple, rugged and dependable and have long life in addition to good electrical performance.

The tables below show the electrical and mechanical types of Wagner polyphase squirrel-cage and wound-rotor motors available for industrial applications.

ELECTRICAL TYPES OF WAGNER POLYPHASE MOTORS

Type	Ratings	Electrical Characteristics	Applications
RP-1	1-10 to 400 hp 3- and 2-phase 25 to 60 cycles 110 to 2300 volts	Normal Torque—Normal Slip	Group or individual drives on machine tools, fans and blowers, compressors, centrifugal pumps—on any applications where normal-torque motors are satisfactory.
RP-5	1½ to 100 hp 3- and 2-phase 60 cycles 110 to 2300 volts	High Torque—Normal Slip	Crushers, plunger pumps, belt conveyors starting under load, large air compressors, large refrigerating machinery, mixers, and other applications requiring high starting-torque.
RP-6	½ to 150 hp 3- and 2-phase 25 to 60 cycles 110 to 2300 volts	High Torque—High Slip	Punch presses, shears, metal-drawing operations, balers and other machinery equipped with flywheels or having flywheel effect.
RP-7	1 to 50 hp 3- and 2-phase 25 to 60 cycles 110 to 550 volts	High Torque—High Slip	Elevators, cranes, hoists, dumbwaiters.
RS-1	1 to 250 hp 3- and 2-phase 25 to 60 cycles 110 to 550 volts	Continuous Duty—constant and adjustable varying speed	Conveyors, compressors, pulverizers, etc., requiring continuous operation.
RS-2	2 to 200 hp 3- and 2-phase 25 to 60 cycles 110 to 550 volts	Intermittent Service—Crane and hoist duty	Elevator, crane, hoist, and like services which operate intermittently.

MECHANICAL TYPES OF PROTECTED AND ENCLOSED SQUIRREL-CAGE MOTORS

Type	Ratings	Mechanical Characteristics	Applications
CP	1½ to 125 hp 2- or 3-phase 25 to 60 cycles 110 to 2200 volts	Totally-Enclosed Fan-Cooled	Locations where dust, filings, fumes, moisture, and other abrasive and corrosive agencies shorten the life of open-type motors.
HP	¾ to 125 hp 2- or 3-phase 25 to 60 cycles 110 to 2200 volts	Explosion-Proof	For Class 1 Group D locations involving flammable volatile liquids, highly-flammable gases, and other highly-flammable substances.
TP	¼ to 15 hp 2- or 3-phase 25 to 60 cycles 220, 440, or 550 volts	Totally-Enclosed Nonventilated	(The equivalent of type CP, but in smaller ratings not needing external fan cooling.)
DP	¼ to 5 hp 2- or 3-phase 25 to 60 cycles 110 to 550 volts	Dripproof	Locations involving dripping liquids and falling metal chips and other particles.
XP	¾ to 50 hp 2- or 3-phase 25 to 60 cycles 110 to 550 volts	Splashproof	For outdoor and indoor locations where motors are subjected to splashing liquids.

M45-21

OTHER WAGNER PRODUCTS

Write for Bulletin TU-180 on Wagner Transformers, and Bulletin IU-186 on Wagner Industrial Hydraulic Braking Systems.

Wagner
ELECTRIC CORPORATION
6459 Plymouth Avenue, St. Louis 14, Mo., U. S. A.
ELECTRICAL AND AUTOMOTIVE PRODUCTS

Send for
BULLETIN MU-185
FOR COMPLETE MOTOR INFORMATION

undisputable superiority . .

. . . FOR SAFE PACKAGING

INLAND STEEL CONTAINERS

Made in a wide variety of cover styles and openings suitable for easy filling and safe airtight packaging of products.

NO LEAKAGE
NO SPOILAGE
NO CONTAMINATION

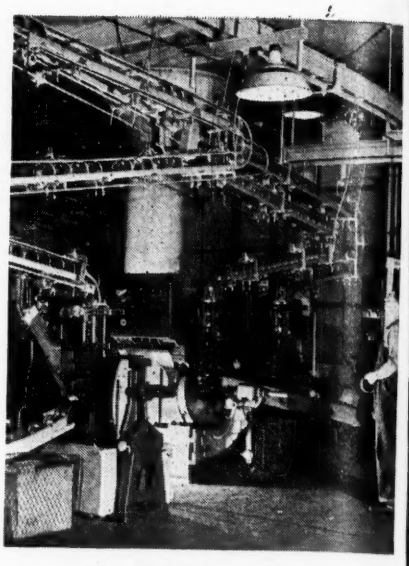
1. Lever locking ring drum No. 55188
2. Lever locking ring pail No. 514X
3. Swivel-spout por-pail No. 584R
4. Bead seal pail No. 564
5. Lug covered pail No. 584

INLAND STEEL CONTAINER CO.

Container Specialists

6532 S. MENARD AVE., CHICAGO 38, ILLINOIS

Plants at: Chicago • New Orleans • Jersey City



CAN PRODUCTION

Approximately 700,000,000 cans for vacuum packed coffee will roll off the lines of the American Can Co. in 1946, despite the tin shortage. Wartime research techniques of coating and soldering black iron sheets make this production possible. Here the cans are shown passing through the flanging machine, which cuts rims on top and bottom of cans.

Packing Dry Milk Nonfat Solids for Civilian Feeding, C. Q. D. No. 368, May 16, 1945, Amendment 2, Aug. 21, 1945. Superseding Amendment 1, June 22, 1945. Pork and Apple Sauce, C. Q. D. No. 312. Aug. 16, 1944, Amendment 2, Aug. 3, 1945. Superseding Amendment 1, Oct. 18, 1944. Canned Beef and Pork Loaf, C. Q. D. No. 374, July 25, 1945, Superseding C. Q. D. No. 20F, Type II. Canned Chopped Ham and Eggs, C. Q. D. No. 375, July. 27, 1945. Superseding C. Q. D. No. 20F, Type IX. Candy Bar, C. Q. D. No. 307, July 30. 1944, Amendment 1, Aug. 8, 1945. Sweet Chocolate Bar, C. Q. D. No. 168A, Oct. 4, 1944, Amendment 1, Aug. 8, 1945. Canned Solid Pack Chicken, C. Q. D. No. 332A, July 28, 1945, Superseding C. Q. D. No. 332, Nov. 17, 1944. Chicken and Vegetables, C. Q. D. No. 303B, July 25. 1945, Superseding C. Q. D. No. 303A, Nov. 23, 1944. Canned Corned Pork with Carrots and Apples, C. Q. D. No. 383, Aug. 3, 1945, Superseding C. Q. D. No. 20F. Type I. Canned Beef and Gravy, C. Q. D. No. 151C, Aug. 11, 1945, Superseding C. Q. D. No. 151B, Nov. 28, 1944. Canned Corned Beef, C. Q. D. No. 41B, Aug. 22. 1945, Superseding C. Q. D. No. 41A. Mar. 8, 1945. Packaging and Packing of Dehydrated Vegetables with In-Can Dehydration, C. Q. D. No. 384, Aug. 29, 1945. Canned Cheese Spread, C. Q. D. No. 358. Mar. 13, 1945, Amendment 1, Aug. 29. 1945. Packaging and Packing Assembly Complete Type K Ration, C. Q. D. No. 28H, Aug. 31, 1945, Superseding C. Q. D. No. 28G, Oct. 31, 1944. Life Raft Ration, C. Q. D. No. 164B, Sept. 11. 1945. Superseding C. Q. D. No. 164A, June 7. 1944. Assault Lunch, C. Q. D. No. 386. Sept. 24, 1945. Lemon Flavoring Capsules, C. Q. D. No. 385, Aug. 29, 1945. Packaging and Packing Canned Subsistence Items for Overseas Shipment. C. Q. D. No. 350A, June 23, 1945, Amendment 2, Sept. 27, 1945, Superseding Amendment 1, July 16, 1945. Air Crew Lunch, C. Q. D. No. 319A, Sept. 21, 1945. Superseding C. Q. D. No. 319, Sept. 15. 1944. Canned Flaked Lake Fish, C. Q. D. No. 387, Oct. 18, 1945. Frozen Fabricated Veal, C. Q. D. No. 371A, Oct. 24, 1945. Superseding C. Q. D. No. 371, June 12. 1945. Textile and Paper Bags and Sacks for Overseas Shipment of Subsistence. C. Q. D. No. 403, Aug. 28, 1945, Superseding O. Q. M. G., No. 103A, June 8. 1944. Pasteurized Milk (Reconstituted. Blended and Standardized with Reconstituted Skim Milk), C. Q. D. No. 137A, Feb. 24, 1944, Amendment 1, Nov. 2, 1945. Prepared (Ready-to-Eat) Breakfast Cereals.

A 96 YEAR TREND BACKS LOS ANGELES' GROWTH

SINCE the days of '49, people have been heading West... *and they still are.*

The continuing shift of population to the West has dual importance to manufacturers: markets are moving West and labor supply is moving West.

For example, while every other geographic section of the Nation was sustaining a population loss during the 1940-1943 years, the Pacific Coast states showed a civilian population gain of 13.3%.

Example 2: From 1943 to 1944, *after* the peak of war industry migration had been reached, California's population gain of 279,044 was more than twice as great as that of the next state.

Investigation will show why Los Angeles has been the focal point of this Westward movement... why it is the capital of the West in population, in markets, and in industry. In choosing a new plant location, it is important to remember that even before the war the Los Angeles area had half of all the industrial establishments in California. There are sound economic reasons for this overwhelming preference. Let us tell you about them. Your inquiries are invited and will be treated in full confidence.

Los Angeles City-Owned

DEPARTMENT OF WATER AND POWER

207 South Broadway, Los Angeles 12, California

"Serving the water and power needs of 1,700,000 citizens"

Los Angeles OFFERS INDUSTRY:

1. Rich market, expanding with the Westward trend
2. West's largest population and largest supply of skilled labor
3. A home owning community where people prefer to live and work
4. Lowest general power rate of any major U. S. industrial center
5. Water supply ample for city of 7,750,000, at reasonable rates
6. Room for plant expansion and decentralization
7. Low construction costs; year 'round production schedules
8. Economic stability through diversified industry
9. Magnificent harbor; springboard to all the Pacific nations
10. Accessibility to the storehouse of raw materials in the West and the Far East

FOR BUSINESS EXECUTIVES...

For reliable, complete information about this industrial metropolis, ask to have us reserve you a copy of "F.O.B. LOS ANGELES," a new brochure now in preparation. Just sign and attach to company letterhead.

NAME _____

TITLE _____

FI

Los Angeles 1st IN THE WEST 1st IN YOUR INDUSTRIAL FUTURE

Preparing samples for vitamin analysis by fluorometric methods in the Schwarz vitamin laboratory.

Are your products meeting demands for *vitamin content?*

Food and beverage manufacturers today must satisfy a public that is definitely vitamin-conscious—and being constantly educated in the functions and importance of these nutritional elements.

To aid manufacturers in insuring adequate vitamin content and its maintenance throughout processing procedures is one of the important features included in Schwarz Laboratories service.

Complete assays for vitamins, minerals and other elements; development of procedures for protecting vitamin content; establishment of correct vitamin control tests, development of better control methods are some of the phases of this service.

A new, illustrated, 20-page bulletin *"Scientific Quality Control of Foods and Beverages"* gives interesting information about vitamin assay, and also chemical and biological analyses, industrial fermentation, yeast culture, food research, process examination and control, food plant design and other Schwarz Laboratories services. We will gladly send you a copy—write for it now.

Schwarz

202 EAST 44th ST.
NEW YORK 17, N. Y.

LABORATORIES, INC.

USDA Announces More "A" and "Star" Awards

THIRTEEN more food processing companies have been certified as eligible to receive the U. S. Department of Agriculture's Achievement "A" Award, and 21 more food processors have won the Department's "Star" Award. At least one more award board meeting will be needed to consider nominations heretofore unreviewed or pending the receipt of additional data.

The plants receiving "A" awards are:

Pet Milk Co., Siloam Springs, Ark.; Tasty Foods Co., Denver, Colo.; Dean Milk Co., Belvidere, Ill.; Rath Packing Co., Waterloo, Iowa; The Frank Tea and Spice Co., New Iberia, La.; Boston Sausage and Provision Co., Boston, Mass.; Cherry Growers, Inc., Traverse City, Mich.; True Food Dehydrators, Inc., East Grand Forks, Minn.; R. U. Delapenha and Co., Inc., Brooklyn, N. Y.; American Foods, Inc., Grand Forks, N. D.; Kraft Cheese Co., Hollis, Okla.; Interstate Cotton Oil Refining Co., Sherman, Tex.; Wapato Evaporating Co., Wapato, Wash.

The plants receiving "Star" Awards are:

Chester B. Franz Co., Mammoth Springs, Ark.; George V. Hoskings, National City, Calif.; The Amalgamated Sugar Co., Burley, Idaho; General Mills, Inc., Purity Oats Div., Keokuk, Iowa; American Foods, Inc., Dezauche and Son, Opelousas, B. F. Trappey's Sons, Inc., Lafayette, Warriner Starch Co., St. Francisville, La.; Interstate Creamery Co., Inc., Cedar Springs, Mich.; Wilson and Co., Inc., Albert Lea, Minn.; E. Pritchard, Inc., Winslow, N. J.; Comstock Canning Co. plants in Egypt, Marion, Red Creek and Rushville, H. J. Heinz Co., Medina, Quaker Maid Co., Inc., Brockport Cannery, Brockport, N. Y.; The Humko Co., Memphis, Tenn.; Zigler Canning Cooperative, Inc., Timberville, Va.; Fisher Flouring Mills Co., Seattle, Bozeman Canning Co. plants in Ellensburg and Monroe, Wash.

DISTRIBUTION

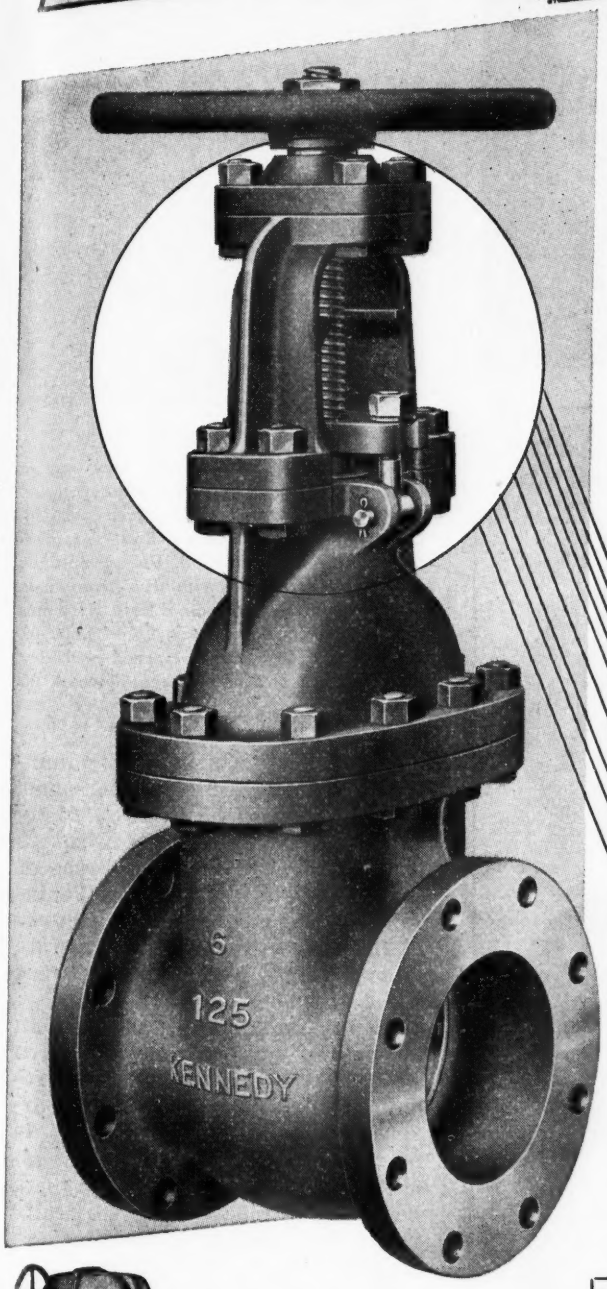
Tin Supply Still Dim On Word From Pacific

A MINIMUM, and only a minimum, amount of tin will be available for tin cans next year. The story that the Japs left 17,000 tons of tin on the dock in Malaya has evaporated in the light of the cold hard facts. Only about one-tenth of that amount is now known to exist.

Rumors that both smelters were in operation at the time the British went into Malaya have proved false. The Singapore smelter is out of commission. It will be some time before this plant can be returned to operating condition. On the other hand, the Penang smelter was found to be undamaged, and presumably it is being put into operation as soon as fuel, raw materials and labor can be assembled. This will take time.

One of the big problems is the

"Trifles make perfection but perfection is no trifle"



A YOKE that does far more than merely "fasten together"

Originally, the word "yoke" was applied to the contrivance that kept two oxen or other draft animals in line. But the yoke of a Kennedy outside stem and yoke valve is far from merely a contrivance for alignment. Note these features for extra strength, convenience, and ease of operation in Kennedy Standard Iron Body Wedge Gate Valves:

- One-piece yoke, wide and ribbed
- Four large bolts at yoke cap
- Extra large bolts at yoke-bonnet connection
- Bronze-to-bronze stem thread contact surfaces
- Stem contact surface in yoke cap 1½ times stem diameter
- Collar to keep stem in alignment and to prevent side thrust of stem against packing
- Provision for lubricating yoke nut bearing surfaces
- Shelves to hold gland well out of the way when repacking
- Every bolt nut accessible to a standard open-end wrench

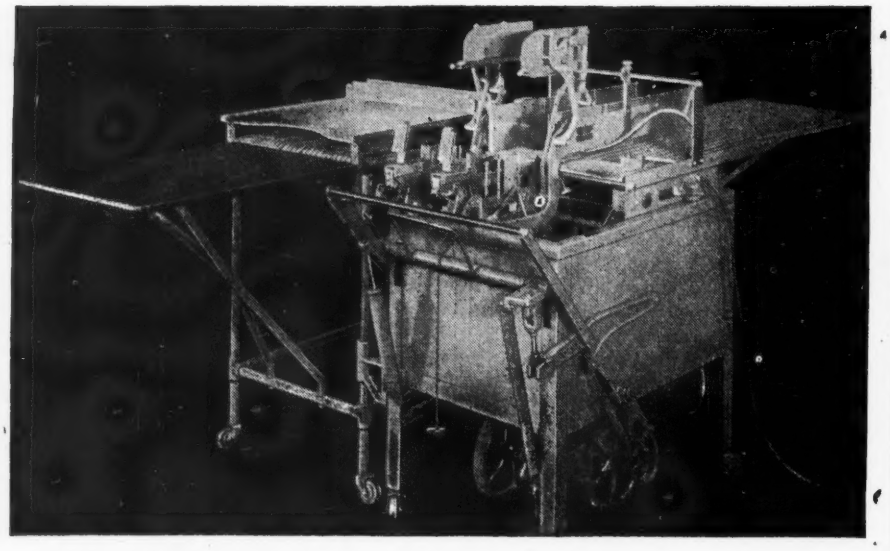
These details are typical of the many provisions for long-continued satisfaction built into every Kennedy Valve type . . . they indicate the many advantages of standardizing on these high quality valves.

Write for the Kennedy Catalog

THE KENNEDY VALVE MFG. CO.
ELMIRA NEW YORK

One of a series of advertisements explaining how Kennedy gives careful attention to the details of valve design, construction and workmanship that provide maximum effectiveness, convenience, and length of service.

KENNEDY *valves . . . pipe fittings . . . fire hydrants*



Miller

MODEL MPS WRAPPING MACHINE

WRAPS many sizes, cuts its own wrappers from rolls. Quickly adjustable without tools. Standard Model heat seals. Can also be furnished to glue seal. Mounted on casters, the Miller Model MPS can be rolled to the job. Plugs into any wall outlet for power.

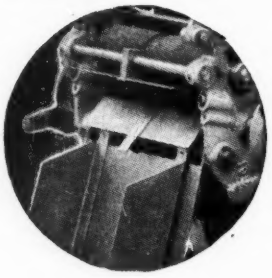
Send us samples of your packages for information on this versatile wrapping machine. Quick deliveries possible.

MACHINES FOR: Wrapping, Bag Making, Bag and Carton Filling, Bag Crimping or Closing, Gluing and Sheeting, Sandwich making.

IF YOU PACK IN BAGS MILLER OFFERS . . .

SIMPLEX HIGH SPEED BAG MAKER

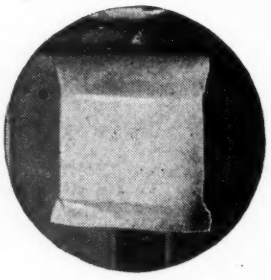
Makes 2500 to 4000 perfect bags per hour.



★

AMSCO ROTARY BAG SEALER

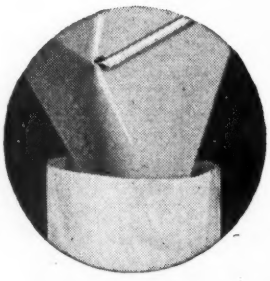
Seals up to 75 bags per minute automatically.



★

HOLM FILLING MACHINE

Automatically fills, by weight, 18 to 20 bags or cartons per minute.



Miller Wrapping & Sealing Machine Co.

12 SOUTH CLINTON STREET, CHICAGO 6, ILLINOIS

FLYING REFRIGERATOR

This wirebound crate of corn was part of a three-ton load of different types of perishables flown from San Francisco to Chicago and New York in the first "flying refrigerator." The ship, a United Airlines DC-3, was equipped with five large insulated compartments made of fibre glass curtains, each accommodating up to 1,600 lb. Pockets at the top were packed with dry ice, which kept temperatures between 35 and 45 deg. F.

difficulty of recruiting top administrative and technical personnel for operation of the smelters. Many of the key men have been prisoners of the Japanese since the "sons of the setting sun" overran the Peninsula. These men are returning to their homes in Europe to recuperate from the hardships they underwent while prisoners of war.

So far the British have sent an ore-buying mission into the area which, according to the latest reliable reports, has only recently arrived in Malaya. This group is now appraising the condition of facilities. Up to mid-November there had been no report of any difficulty with the native population in British Malaya. It was much too early, of course, to expect a report on what the Japanese left in the way of machinery that might be put to industrial use.

With the rebellion in Java going on, the situation there is far from rosy. The native uprising has slowed the influx of officials. In spite of this, a small group of engineers of the Billiton Tin Co. arrived on Billiton Island off the coast of Java. They are reported to have met with no trouble with the native population.

In making any estimate of when tin will again be produced, officials explain that it will take some time

Even a steam bath won't faze a SEALEDPOWER

The **SEALEDPOWER** Motor, an exclusive Crocker-Wheeler design, was developed for just such difficult applications as this . . . applications where excessive moisture and corrosive fumes make short work of less well protected motors.

Neither steam nor fumes can penetrate to the tightly sealed interior of a **SEALEDPOWER** —to the rotor and stator windings where damage could be caused. The exterior surfaces, which are in constant contact with the moisture and fume laden atmosphere of the room, are highly resistant to corrosion.

The **SEALEDPOWER** is also ideal for dusty locations. Unlike ordinary fan-cooled motors, the cooling air is blown over the frame, not through easily-clogged, hard-to-clean passages.

Why not try one of these motors—in a particularly difficult location? If you would like more details, write on your company letterhead for descriptive bulletins. No obligation.

CW-8

CROCKER-WHEELER

A DIVISION OF JOSHUA HENDY IRON WORKS, AMPERE 11, NEW JERSEY

Branch Offices: BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO • WASHINGTON

SQUIRREL CAGE MOTORS WOUND ROTOR MOTORS DIRECT CURRENT MOTORS GENERATORS FLEXIBLE COUPLINGS

HIRE A HOIST!

A Good Hoist Never Gets Tired

Nothing pulls a plant up to par quite so fast as does *good* mechanical handling. Transportation is the key to orderly operation. And *transportation* means movement, *performance*—not just machines or equipment. Hoists that are *right for the work*—properly applied, speedy, easy to operate, durable—*pay for themselves* over and over again in time and money saved. They put movement on a *business basis.*

THERE CAN BE NO SUCH THING AS AN ALL-PURPOSE HOIST

"Hire a hoist" is good advice as far as it goes, but postponing aptitude tests until after installation can be both disappointing and *costly.* If you really want performance, selection is a job for specialists with complete equipment for every service, and the *know-how* of long experience.

Name your job. We'll match it with a "lift" that fits your needs *exactly.* That's why R & M electric hoists have been *first* in the food field for more than 10 years—and first with men who buy *performance.* Write, *right now,* for literature.

This sturdy Type S ½ hoist lifts 1000 lbs. at 32 f.p.m. over a full 20 feet. Low headroom (21"), light weight, high speed, and small size make it an ideal hoist for many food processing uses. Hundreds of installations prove its long life under peak loads and rough handling. Others for every service.

ROBBINS & MYERS • INC.
HOIST & CRANE DIVISION • SPRINGFIELD, OHIO
In Canada: Robbins & Myers Co., of Canada, Ltd., Brantford, Ont.
MOTORS · MACHINE DRIVES · FANS · MOYNO PUMPS · FOUNDED 1878

for the damage to be assessed. Additional time will be required for repairs to reach the scene and to be installed in both Malaya and the Netherlands East Indies. The more mechanized operations will be delayed until adequate equipment and repairs are available. The lack of parts will be fatal to early operation.

In the meantime, it is believed that a small production will originate in the Chinese-owned mines in Malaya and perhaps from a few of the deposits of the Netherlands East Indies.

Certain tonnages of concentrates have been found in Burma, Malaya and Siam, but it is not believed that these will be moved to treatment works until the ownership has been worked out.

The outlook for the long term definitely is favorable, but in the immediate future conservation must be practiced lest the supply of tin for food containers runs short.

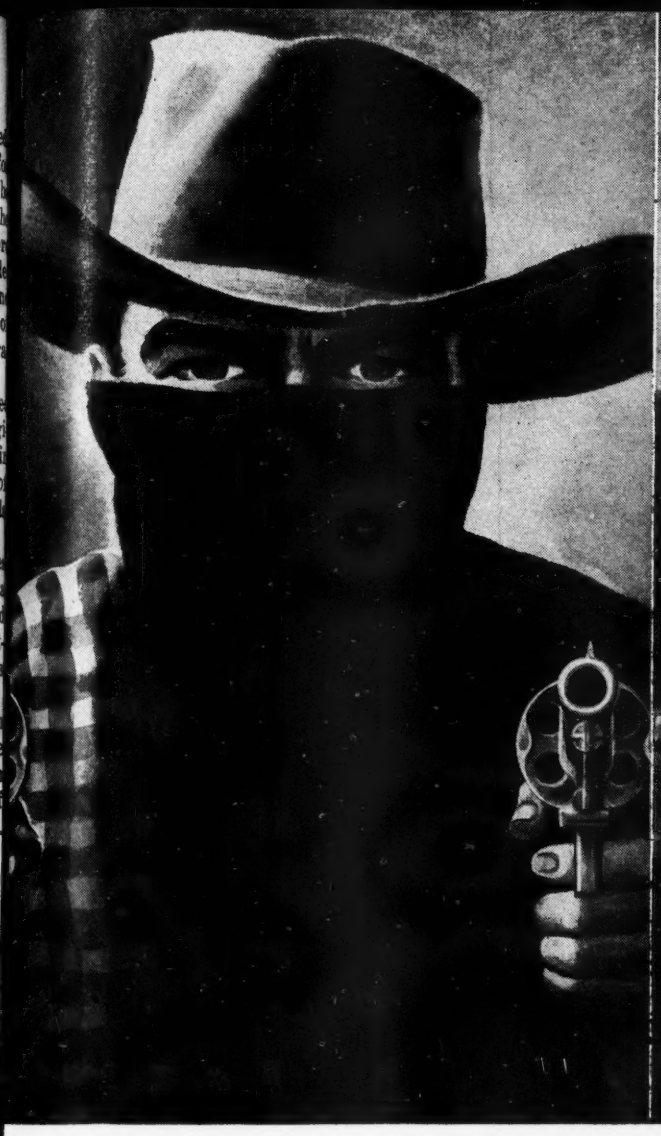
Plan Program To End Food Subsidy Payments

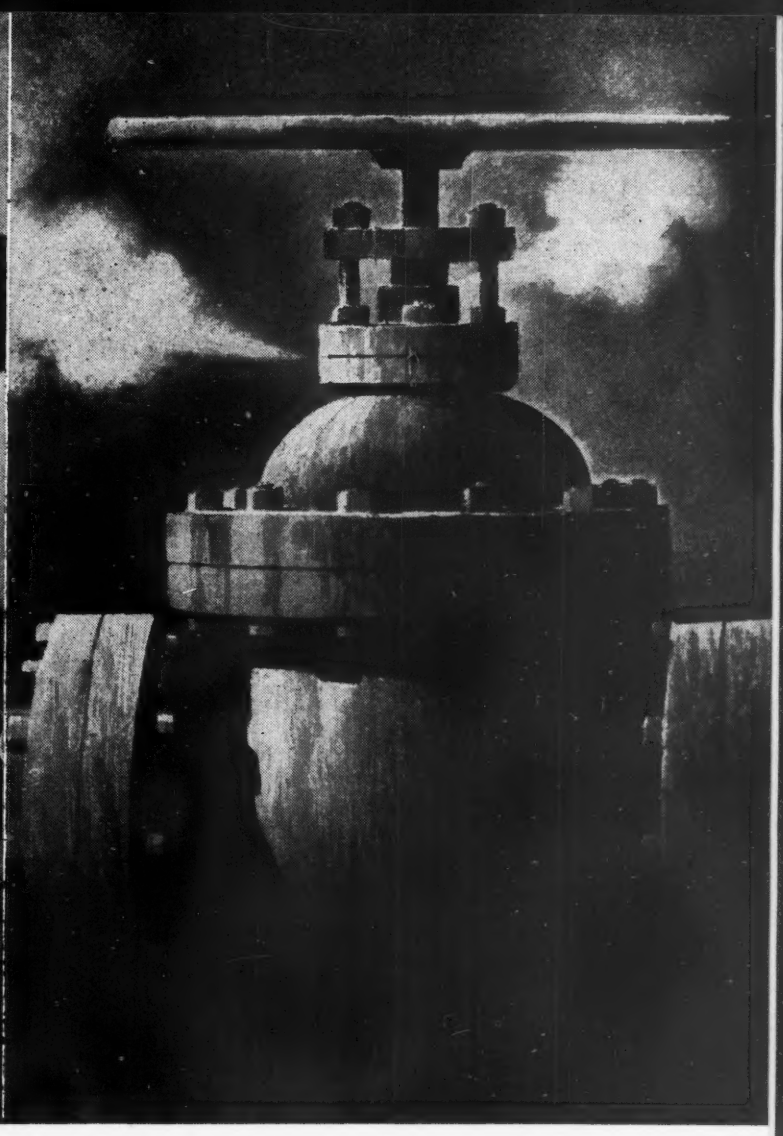
VIRTUALLY all wartime food subsidies will be terminated by next June 30, said Stabilization Director John C. Collett, when he announced his approval of a definite schedule for ending these subsidies on specific commodities. Butter and peanut butter subsidies, already withdrawn, were the first moves in the termination program.

Judge Collett indicated terminations on cheese as not later than February 28; the rollback subsidy on pork, not later than March 31—the 40 cent subsidy per live hundredweight, along with subsidies on feeder cattle, beef, sheep and lambs not later than June 30; canned fruits and vegetables, not later than the end of the 1945 crop; dairy production payments and flour subsidies, not later than June 30, and vegetable shortening, not later than the end of this month.

Long Used Brand Names Get Awards of Merit

BRAND names of food products have come in for a prominent share of the recognition being given old established industrial products by the Brand Names Research Foundation. The purpose of this newly founded group, according to Henry R. Abt, managing director, is to focus public attention upon products that have held public support over a period of at least 50 years, thus





Industry's Jesse James . . . 1945

IN YOUR PLANT today you'll find a bandit that steals production efficiency and profits in true two-gun style.

Worn-out veteran valves – and others made prematurely old through the overload of war production schedules – can operate smoothly yet fail at critical process points, causing heavy loss of material. They may interrupt tight schedules when time-out for repair or replacement stalls production. Beyond economical repair, they may boost maintenance beyond reasonable limits.

Forestall Trouble!

The sensible thing of course, is to ferret out these valves *before they cause trouble*, and replace them with the valves that give you the most dependable operation, at the lowest maintenance cost in the long run . . . Jenkins Valves! The craftsmanship, quality of materials, and leadership of design that Jenkins builds into valves is your guarantee of this long life, and economical trouble-free operation. The only question is: *Which valves can I justify replacing?*

Jenkins Bros. "Valve Retirement Plan"

Fortunately, Jenkins Engineers have worked out a plan, simple yet thoroughly proven-in-practice, whereby you can spot just such valves and justify their replacement on a simple score sheet of condition. Not an advertising promotion, but a sincere service offered by Jenkins to help on post-war problems. Jenkins Bros. "Valve Retirement Plan", now in operation in many plants, is proving valuable to management, maintenance engineers, superintendents, and operators. Free, no obligation. Send coupon for your company's plan today, to: JENKINS BROS., 80 White St., New York 13, N. Y.

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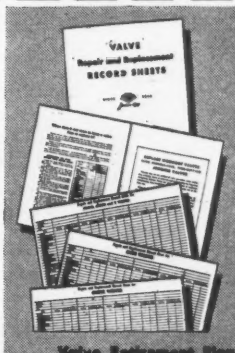
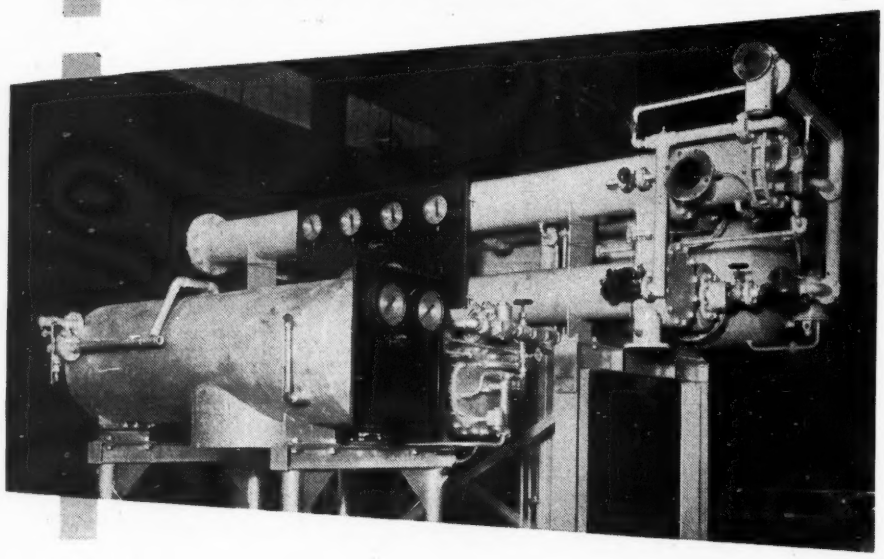


Valve Retirement Plan with Record Sheets

BOILING WATER AT 38° F. IN A ROSS DECALORATOR

IS A CASE IN POINT FOR THE FOOD PROCESSING INDUSTRIES



Why does water boil at 38° F. in a Ross Decalorator? It boils because of the extremely low absolute pressure maintained by a Ross Three-Stage Steam Jet Ejector.

This low absolute pressure is maintained more dependably and economically than with any other type of vacuum pump.

It's a case in point for the food processing industries, because this same Ross Ejector (single or multi-stage, operating with or without Ross inter and after condensers of the surface or barometric type) is one of the most simple, efficient and economical vacuum pumps for removing air, vapors or gases. This applies to the handling of many types of mixtures: wet or dry, slightly sticky or solid. Only steam or water need be available for efficient operation. Little or no supervision and maintenance are required.

Consult Ross' engineers about the particular advantages of Steam Jet Ejectors in: Vacuum Distillation, Deodorization of Edible Oils, Deaeration of Fruit and Berry Juices, Degasification, Vacuum Packing, Dehydration, Evaporation, Concentration, Vacuum Cooling, etc. You will be furnished with information and recommendations based on long experience in this specialized field.

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demonstrating both their quality and their acceptance.

The foundation is supported by membership subscription from industry in general. The food industry, already represented on the board of directors by Donald Douglas, vice-president, Quaker Oats, will have further board representation when the Grocery Manufacturers of America designate another food member.

The awards are made at one day demonstrations in selected large cities, where the brand names in that area are awarded certificates celebrating their 100, 75, or 50 years of existence. Such functions have already been held in Philadelphia, Chicago and Cincinnati.

Brand names in the food field eligible for the 100 year award are: "Baker's Premium No. 1", established 1780; "P. Ballantine & Sons", 1840; "Whitman's", 1842; "Heckers," 1843, and "Burnett's Vanilla," 1845.

Packaging Institute Hears About Machinery

MACHINERY MANUFACTURERS, meeting in New York, November 26 and 27, with other members of the Packaging Institute, were told that the food manufacturer, along with producers of pharmaceuticles and cosmetics, want packaging machinery as soon as possible. The machinery must be designed for cleanliness and sanitation and must be kept that way. It must have simplified lubrication and maintenance through accessibility of parts. These are demanded not only for production reasons, they are absolute necessities for any manufacturer who is subject to Food and Drug inspection.

Delivery schedules for packaging machinery are still slow, most manufacturers promising orders already scheduled in a matter of months, new orders in a year or more, and new designs in 1947.

Lifting of Tin Quotas Adds No Tin to Supply

REVISION of M-81, in the middle of November, permitted a broadening of the essential civilian list of food products, included in the order, from 138 to 190. All quotas were lifted entirely. No restrictions were left on the amount of each product that may be packed.

This order was the direct result of the termination of the set aside orders for use of the military. The lowering of Army and Navy re-

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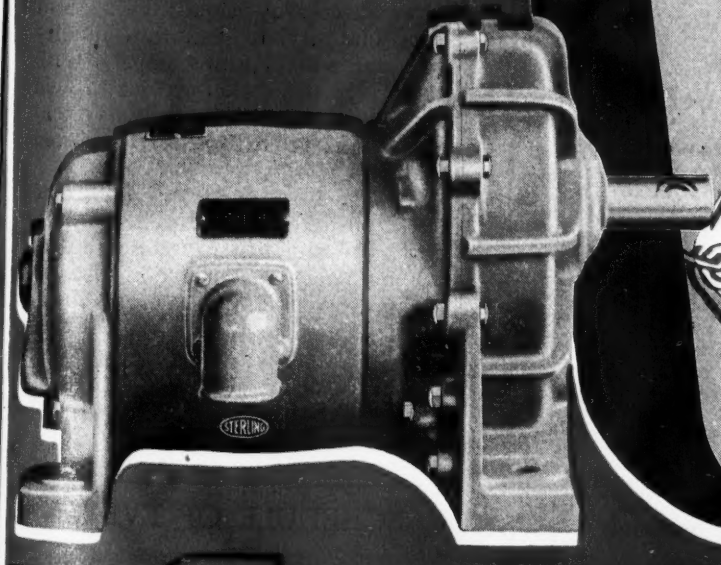

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THAT PRESSING pepper problem—solved for you at last by the MM&R laboratories! All over the country, manufacturers who have felt the pepper pinch are turning to the new, scientifically exact pepper replacement—Imitation Black Pepper Oil MM&R.

In flavoring strength, Imitation Black Pepper Oil MM&R is amazingly similar to oil black pepper . . . may be used pound-for-pound as the natural oil. For character and quality, it lives up to the usual high standard of all MM&R scientifically manufactured replacements. The remarkable economy of Imitation Black Pepper MM&R further recommends it. Write the MM&R Technical Department for complete details.

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SINCE 1895... ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS

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LOS ANGELES: BRAUN CORP. • SEATTLE, PORTLAND, SPOKANE: VAN WATERS & ROGERS, INC.
SAN FRANCISCO: BRAUN-KNECHT-HEIMANN-CO. • CANADA: RICHARDSON AGENCIES, LTD., TORONTO

quirements allowed for the shifting of the available can supply.

Officials of the Civilian Production Administration definitely state that the amendment to M-81 does not mean an increase in the amount of tinplate that can be made available for food packing, or for any other use. The supply of pig tin remains just where it was, in such shape that unless additional tin supplies arrive before next July there may be trouble.

Grade Labeling Group Market Common Brand

GRADE labeling took a new turn on the West Coast, last month, with the announcement of the formation of a national sales agency for a group of fruit and vegetable canners, who operate under U. S. continuous inspection. The new group, to be known as Certified Foods, will market a full line of products under a common label and brand designated "Your Certified." Dwight Paulhamus, former sales manager of Tri-Valley Packing Association, is the managing director of the agency, whose headquarters will be San Francisco.

This is not the first time that smaller food packers have attempted to market their products under a common brand name. None of these former groups, however, was ever successful, usually because of the inability to maintain quality standards among all members. With the U. S. inspection service to hold up quality control, the industry concedes this group a better than even chance.

In the beginning only one grade will be offered on each product, says the announcement. Sources of supply have been established in various producing areas with members of the U. S. Inspected Foods Educational Service. The participating packers share jointly in the ownership and control of the new label.

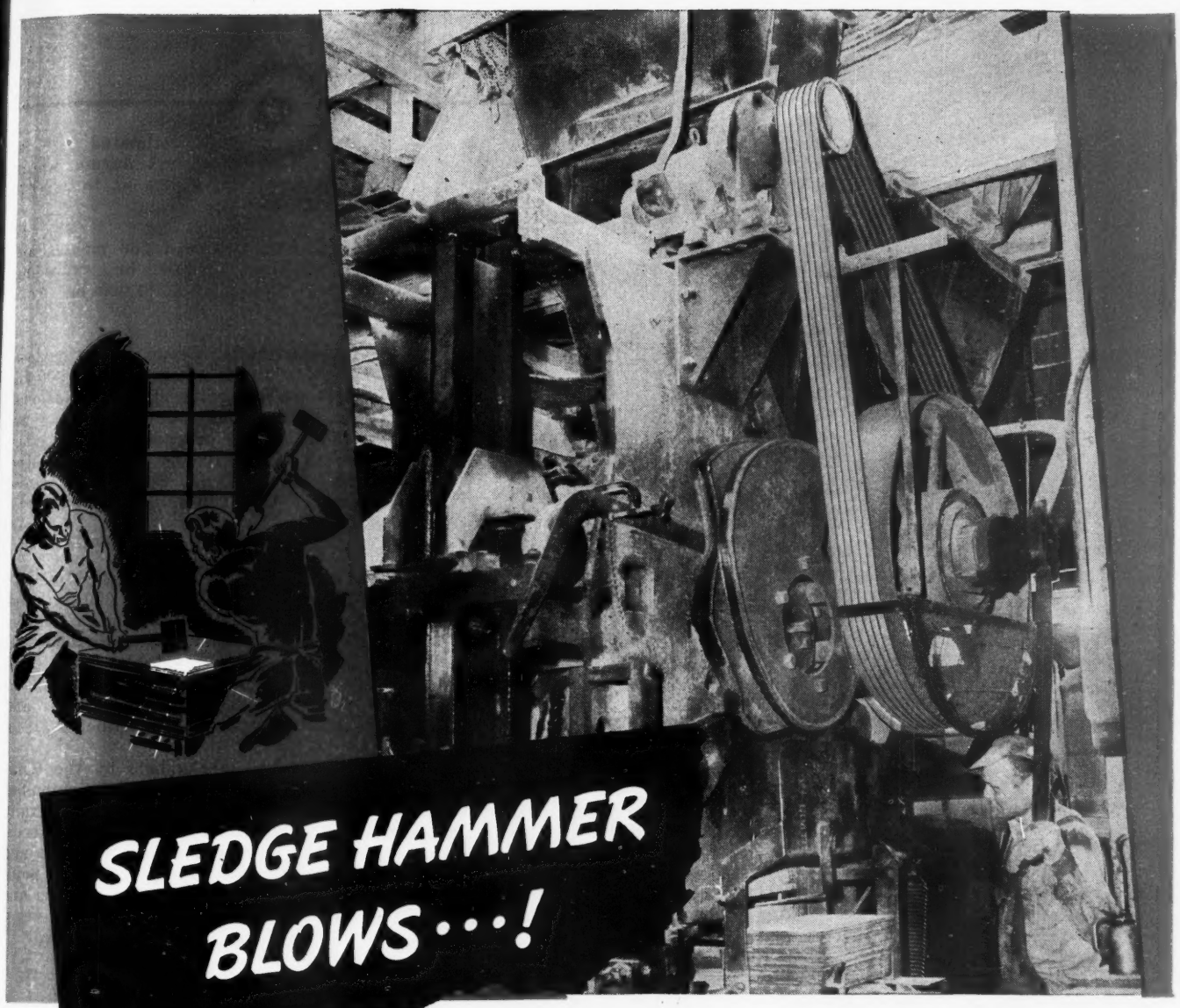
SCHEDULE OF EVENTS

DECEMBER

5- 7—National Association of Manufacturers, golden anniversary congress of American industry, Hotel Waldorf-Astoria, New York.
10-12—American Society of Refrigerating Engineers, 41st annual meeting, Hotel Pennsylvania, New York.
12-14—American Bottlers of Carbonated Beverages, annual meeting, Morrison Hotel, Chicago.
13-15—Southern Association of Ice Cream Manufacturers, St. Petersburg, Fla.

JANUARY

9-11—National Dairy Council, 27th annual meeting and winter conference, Hotel Roosevelt, Pittsburgh, Pa.



SLEDGE HAMMER BLOWS . . . !

Dayton V-Belts reduce slippage, giving extra momentum and longer belt life!

Building blocks—six a minute—come steadily from this giant tamper. The tremendous impact from the sledge hammer blows that are necessary to form the blocks puts a terrific strain on the power transmission drive.

The original drive couldn't take it, so Dayton V-Belts were given the job. The original flat pulley on the tamper was retained. Only a new V-Groove motor pulley and six Dayton V-Belts were needed to make the change. The result has been greatly reduced slippage; an increased momentum which makes possible a more powerful tamping blow; and a much longer belt life.

This building block tamper job is only one of many thousands of equally tough power transmission jobs on which Dayton V-Belts are lowering maintenance costs, saving space, increasing power drive efficiencies, and operating under conditions of heat, humidity, dust, and other conditions which are ordinary-belt killers.

Your Dayton V-Belt Distributor can put these V-Belt advantages to work in your plant. He is backed by Dayton's 40 years of experience and research in manufacturing natural and synthetic rubber products. It is a combination that will pay real power transmission dividends. Call him today.

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V-Belts by

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INDICATORS

Materials

Corn production on November 1 was estimated at 3,074,000,000 bu., about 4,000,000 bu. under the October 1 estimate, and 158,000,000 bu. below the 1944 record crop. About 87 percent will be harvested for grain.

Rice harvesting continued to indicate a new production mark on November 1, when 72,000,000 bu. was forecast.

Peanut production on November 1 showed the result of heavy rains in the Southwestern area, falling to 2,174,000,000 lb., a drop of about 86,000,000 lb. from the October 1 estimates. This compares, however, with a ten-year average of 1,478,000,000 lb.

Sugar beet crop, estimated at 9,155,000 tons on November 1, while about 36 percent higher than the 1944 crop, is below the ten-year average by approximately 5 percent.

Green lima bean production for processing is estimated at 34,580 tons, exceeding the 1944 production by more than 4,000 tons, or about 4 percent, according to the National Canners Association. This exceeds the ten-year average of 26,440 by 31 percent.

Production

Canned green peas produced in 1945 amounted to a total of 38,145,388 cases of all sizes, according to the National Canners Association. This is an increase over the 1944 pack of 30,130,884 cases.

Flour production in October showed an increase over a year ago, totaling 17,092,801 sacks, compared with 15,219,918 in October, 1944. These figures, compiled by the *Northwestern Miller*, represent 73 percent of the U. S. output.

Canned corn production data for 1945 presages a sizable increase over 1944. Summaries based on replies received by the Corn Canners Service Bureau up to November 15 indicated 30,623,120 No. 2 cans, compared with the 1944 output of 25,982,094 cans by the same companies.

Milk production for 1945 is estimated at 123,000,000,000 lb., compared with 1944 production of 119,064,000.

Macaroni production for 1945 is estimated at 1,040,000,000 lb. by Glenn G. Hoskins, which compares with 819,213,069 lb. produced in 1944. Semolina is expected to reach a total of 853,000,000 lb. and durum flour 280,000,000 lb., both representing increases over 1944. This production results from an estimated rise in production of ground durum wheat from 1944's 21,942,783 bu. to 26,500,000 bu. this year.

Cucumbers produced for pickles are estimated at 7,899,000 bu., exceeding the 1944 crop of 7,551,000 bu. by 3 percent.

Canned fruits, domestically packed, are expected to reach 1,900,000,000 lb., 1945-46, according to the National Canners Association preliminary estimates. This prospect is midway between the 2,100,000,000 lb. of the 1944-45 season and the ten-year average of 1,700,000,000 lb.

In Storage

Frozen fruit in cold storage on November 1 totaled 382,407,000 lb., compared with 360,230,000 lb. on October 1, and 301,590,000 lb. on November 1, 1944. Frozen vegetables were 202,880,000 lb. on November 1, compared with 189,033,000 lb. October 1, and 186,984,000 lb. on November 1, 1944.

Commodity stocks held by the Commodity Credit Corp., as of September 30, included 5,011,322 tons of grain, 190,960 tons of oils and oilseeds, 62,450 tons of livestock products and meats, 158,030 tons of dairy and poultry products, 22,623 tons of fats and oils, 75,282 tons of fruits and vegetables, 13,605 tons of refined sugar.

Indexes

Wholesale price of foods compiled by the New York *Journal of Commerce* stood at 112.1 for the week ending November 24, compared with 108.6 for the October monthly average and 109.0 for November, 1944.

Average activity index of *Business Week* was 167.9 for the week ending November 24, compared with 156.4 a month earlier and 23.04 a year ago.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded November (thousands)	Total Awarded 1945 (thousands)
Bakery	$2,095	$ 547	$ 1,326
Beverages	3,440	1,494	6,281
Canning and preserving	90	68	3,285
Cold Storage	170	735	4,572
Confectionery	110	400	1,635
Grain Mill Products	140	7,365	16,071
Ice, Manufactured	85	1,075	1,579
Meats and Meat Products	345	140	1,058
Milk Products	1,683	2,425	8,340
Miscellaneous	940	2,844	14,626
Complete 1945 totals	$9,098	$17,093	$58,773

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It is simple to install, simple to operate, simple to repair . . . so that it takes a minimum of manpower for its operation at all times. And it delivers power, year after year . . . thanks to the perfection of its design and manufacture.

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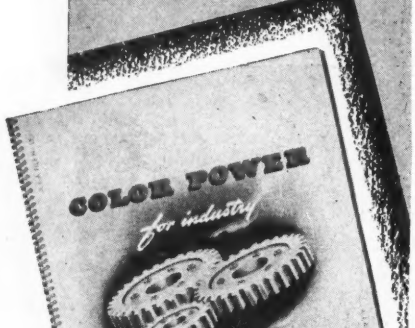

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CLEVELAND, OHIO • LOS ANGELES, CALIF.

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What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

CHEMURGIC CHALLENGE—Agricultural surpluses are beginning to loom above the horizon for agricultural planners. They recognize that at least some grains will be problems for surplus disposal within a year or two. Excesses above demand are expected for other commodities a bit more slowly, but no less surely. Thus the Department of Agriculture is beginning its appeals to Congress for increases in postwar research expenditures. Perhaps food technologists might be making comparable appeals to management to insure that each company gets as large as possible a slice of the new processing business for both foods and non-food by-products.

MORE STORAGE—Better handling of citrus fruit is forecast by the Department of Agriculture if more adequate cool storage arrangements are provided in the warm areas where most of the citrus fruits are grown. The present rapid handling without refrigeration is not producing the best technical result, it appears. These difficulties are being aggravated this particular year because of the continuing scarcity of refrigerator cars. The economics of the situation will have to be studied to determine the most advantageous combination of more cooled storage and cooled transportation with the proper amount of processing for canned products near the point of production. Gaining the greatest over-all dollar benefit will involve some careful estimates in food technology.

LARD DEMAND—OPA expects that reduced freight rates in certain areas will substantially increase the marketing margin for pork products including lard. But OPA with strange conservatism has decided not to lower the ceiling prices.

NOVELTIES FREED—All restrictions on the manufacture of chocolate novelty items have been dropped from the old War Food Administration order. Lessening demand for chocolate products for the military frees these minor products for manufacture and commercial sale. Thus slowly the war rules relax and food technologists can again use business judgment to determine manufacturing policy.

STREAM POLLUTION—Washington is uncertain as to when the Federal Government will take some action to initiate supervision of stream pollution throughout the country. But there seems to be no doubt that sooner or later Congress will pass some law to that effect. This means that the postwar planning at food plants must include a renewed consideration of waste disposal. Any food technologist who knows that his factory is throwing wastes into the sewers that are not adequately handled by the sewage system of his community had better investigate the significance of this before he finds a federal inspector from Public Health Service looking over his shoulder at the disposal records.

NUTS FOR FAT—Ground nuts are to be substituted for certain of the fat or shortening in certain food formulas. They also contribute protein and flavor to the resulting baked goods and other food products. Department of Agriculture workers are urging that housewives throughout the country take advantage of these facts to save cooking fats in home-made products. They will also welcome a comparable change in food formulas by industry where the surplus nut supply can substitute for scarce fats and protein components. It is at least an idea that deserves thought, and enough careful estimating to see whether it is economically practical.

WHAT IS MANAGEMENT?—Some of the most serious labor problems confronting the country is rooted in the question of organization of foremen. It is increasingly necessary now to define accurately the dimen-

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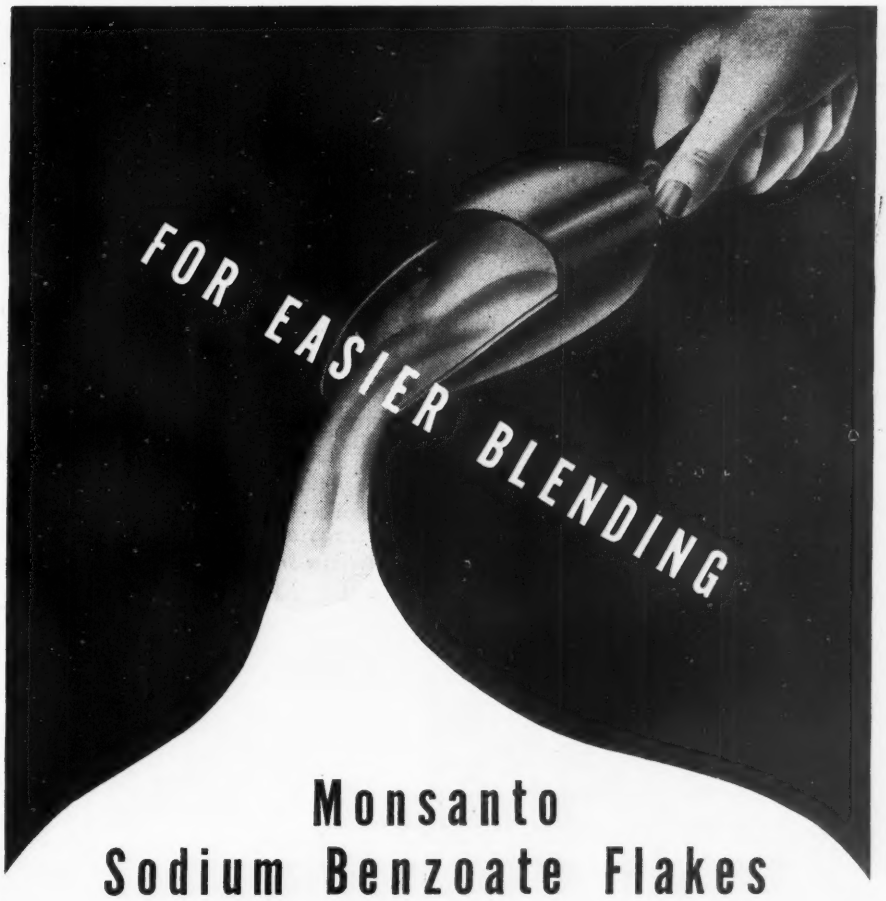
sions of management. In many food factories it is going to be essential, quite soon, to find out whether certain people are a part of management or whether organized labor is to speak for them. The way in which the answer is reached may largely determine the satisfaction or difficulty of labor relations in these plants. It will not be enough merely to call the foremen a part of management. They must be given the dignity and influence along with the title. This is a delicate problem, but one into which food technologists are inevitably going to be thrown.

LUXURIES DEFINED—One of the most interesting definitions of luxury foods was given by OPA late in October. This came through its decision to release 52 miscellaneous commodities from price control because they were not important in their effect on the cost of living. It was an interesting list ranging from pretzels to onion salt with representatives of almost every division of food processing. It will be interesting to see also what the price result of ceiling removal proves to be.

POTATO SCAVENGER—Surplus potatoes have been a serious political headache in Washington. It has been necessary to have many carloads bought under the promise of the government to growers that a floor would be maintained under prices. Incidentally, the processing of these potatoes for some useful service has been attempted. Alcohol was a relatively easy product to develop in the grain fermentation plants of the Middle West. One Philadelphia plant has been put to work also. More difficult was the attempt to convert some of these surplus tubers into glucose. Of course, the potato syrup would have been very welcome as a sweetener in many industries where it could substitute almost directly pound for pound in place of corn syrup. But there is a bigger question involved. It is this. Will the food industries be forced to become scavengers for surplus food crops, which have been developed more or less without regard to sound agricultural economics?

ANOTHER YEAR—American food will have to be packed in some kind of ersatz containers for another year. The tin supply hoped for promptly after V-J Day is not flowing from the Far East. A few supplies, discovered in reserve there, are going to Europe. It will be 1947 before an abundance of tinned containers can be expected for the packing of food crops. Thus, food technologists have another full year in which to develop the ingenious and sometimes superior containers which have been forced on us by wartime. Perhaps some of these will be firmly enough grounded in food enterprise so that they may hold their own even when an abundance of tin is again available.



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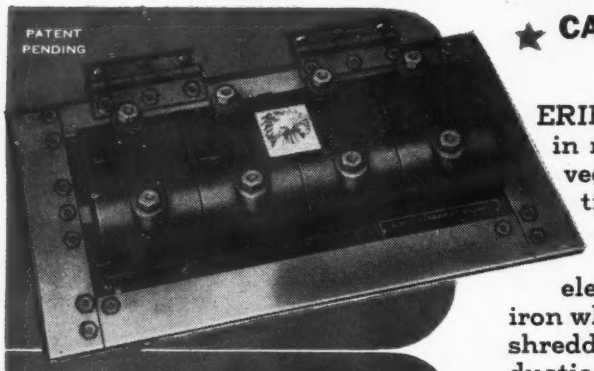
SERVING INDUSTRY...WHICH SERVES MANKIND

HOW TO REMOVE TRAMP IRON FROM FOODS IN PROCESS



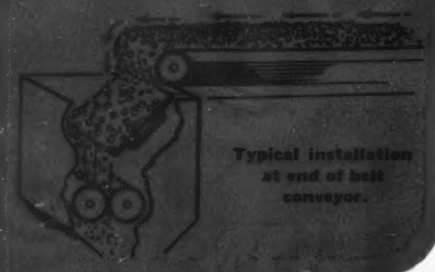
★ CASE STUDY No. 9 Removing Tramp Iron from FRUITS and VEGETABLES

ERIEZ *Permanent Magnets* have saved thousands of dollars in repair bills for many of the country's largest fruit and vegetable canners and bottlers—assuring them, in addition, uninterrupted production and absolute purity of product. *Eriez Non-Electric Permanent Magnetic Separators,* installed at the discharge end of bucket elevators and belt conveyors, efficiently remove all tramp iron which would otherwise fall into grinders, crushers, slicers, shredders, and the like, eliminating machinery damage, production delays and metal contamination. Illustrated below, in cross-section drawings, are two typical *Eriez* Stainless Steel installations in a large fruit-juice extraction plant. *Eriez* magnets pick out large quantities of tramp metal, such as knife blades, basket clips, tools, bits of wire, pop-bottle caps, etc. *Eriez Magnets* can eliminate many of *your* repair bills, give *you* uninterrupted production, and assure *you* of greater purity of product. Send coupon below for complete information.

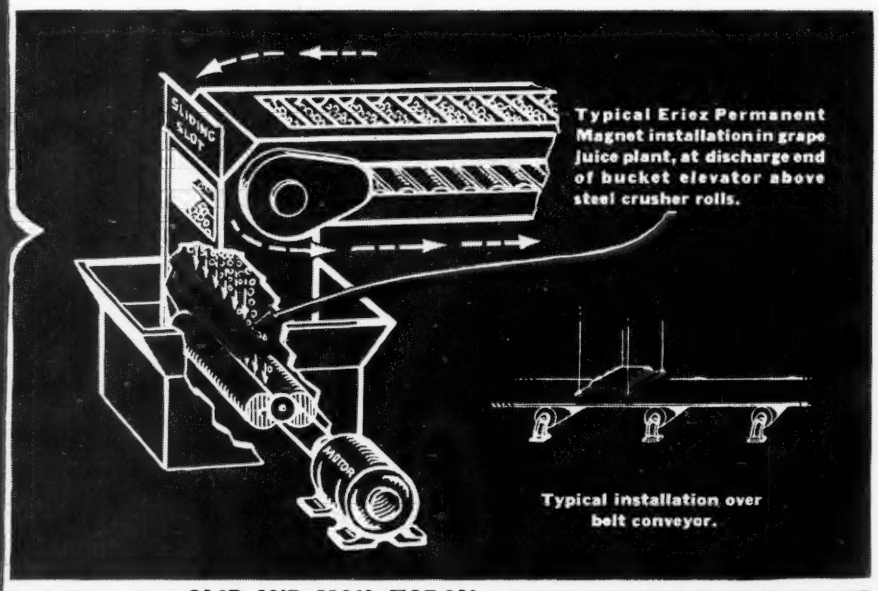
Among the leading manufacturers and processors of foods using *Eriez Permanent Magnets* are: Birdseye-Snider Packing Co., Harold H. Clapp, Inc., H. J. Heinz Co., Cranberry Canners, Welsh Grape Juice Co., California Raisin Co., and many others.

ERIEZ Non Electric Magnetic Separators Are Used in Processing:

★ FRUITS SOUPS
MEATS BARLEY
BAKING POWDER
COFFEE COCOA
CANDIES SPICES
DRIED FOODS
SUGAR JELLIES
★ VEGETABLE RICE
ICE CREAM
PECTIN OIL MEALS
MACARONI MALT
VEGETABLE OILS
HOPS BEVERAGES
WHEAT SYRUPS
CHOCOLATE
CORN FISH MEALS
RELISHES GRAIN
PEANUT BUTTER
FLOUR STARCH
TEA POTATOES
SALAD DRESSING



Typical installation at end of belt conveyor.



Typical Eriez Permanent Magnet installation in grape juice plant, at discharge end of bucket elevator above steel crusher rolls.

Typical installation over belt conveyor.

CLIP AND MAIL TODAY

12

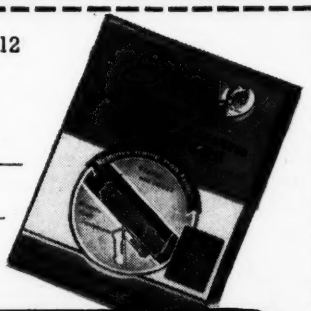
For Your Copy of Bulletin 101A

Eriez Mfg. Co., 101 E. 12th St., Erie, Pa.

Your Name_____

Address_____

City_____ State_____



Eriez
Say EAR' EEZ

ERIEZ MANUFACTURING COMPANY
101 East 12th St. Erie, Penna.

MEN • JOBS • COMPANIES

INDUSTRY

The Borden Co., Inc., is planning another addition to its plant in Van Wert, Ohio, to increase its production of Liederkranz cheese by about 20 percent.

Burry Biscuit Corp. has entered the confection field with the formation of Margaret Moffat, Inc., combining the operations of J. T. Matchett Co., Brooklyn, and Golden Brand Nut Products, Inc., New York, which have been purchased by Burry. Specialties to be made by Margaret Moffat include glaced fruits, nuts and chocolates.

Dr. Pepper Co. plans a $10,000,000 expansion program to take place during the next two or three years.

Hill Packing Co., Topeka, Kan., has chosen West Memphis, Ark., as the site for a $100,000 canning plant for the manufacture of dog and cat food.

Honey Bee Co. will construct a new $100,000 plant, in Chicago, for the exclusive production of potato chips. When completed, the plant will have a capacity of 10 tons of potato chips daily.

Midfield Packers, Olympia, Wash., is building a new $100,000 quick freezing plant, scheduled for completion the first of the year.

S. A. Moffett Co., Inc., Seattle, Wash., has announced the opening of a new frozen food plant in Seattle, with a freezing capacity of 30 tons daily and storage space for approximately 1,000,000 lbs. of frozen foods. A research and quality control department and additional storage space for 1,000,000 lbs. of frozen food will soon be added to the plant.

Mother's Cake and Cookie Co. is planning construction of a $300,000 plant in Oakland, Calif., it was announced recently.

National Fruit Product Co., Winchester Va., has announced plans for a large program of rebuilding and expansion to increase production. Plans include remodeling of the pectin plant and cider mill at Martinsburg and a new warehouse and processing plant at Winchester.

Sardamack Fisheries has begun construction of a $500,000 fish cannery on Terminal Island, Calif. Gregory Gorby is general manager of the firm.

The Standard Fruit Processing Co., Chicago, has purchased the former plant of the Fleischmann's Yeast Division of Standard Brands, Inc., in Chicago. A remodeling program is now in process.

Van Buren Freezing Plant, Inc., soon will construct a $200,000 quick freezing plant in Van Buren, Ark., for processing fruits, vegetables and poultry.

J. GRAHAM WRIGHT

EDWARD C. PARKER

Edward C. Parker recently was elected president of Joseph Tetley and Co., Inc., packers and distributors of tea, succeeding J. Graham Wright, retiring after more than 43 years with the company, which was established by his father in 1888.

R. E. WOODRUFF

At a recent board of directors meeting of The Coca-Cola Co., R. E. Woodruff was elected president of the company, succeeding A. A. Acklin, who has been placed on the voluntarily retired list because of illness.

HAROLD O. SMITH, JR.

The newly established Washington office of the National Confectioners' Association will be managed by Harold O. Smith, Jr., who has recently completed 4½ years of service with OPA, WPB and the Department of Commerce.

PERSONNEL

George Ball, Opelika, Ala., has been elected president of the Southern Bakers Association. C. B. McMillan, Atlanta, Ga., is marking his 13th year as secretary-treasurer of the organization.

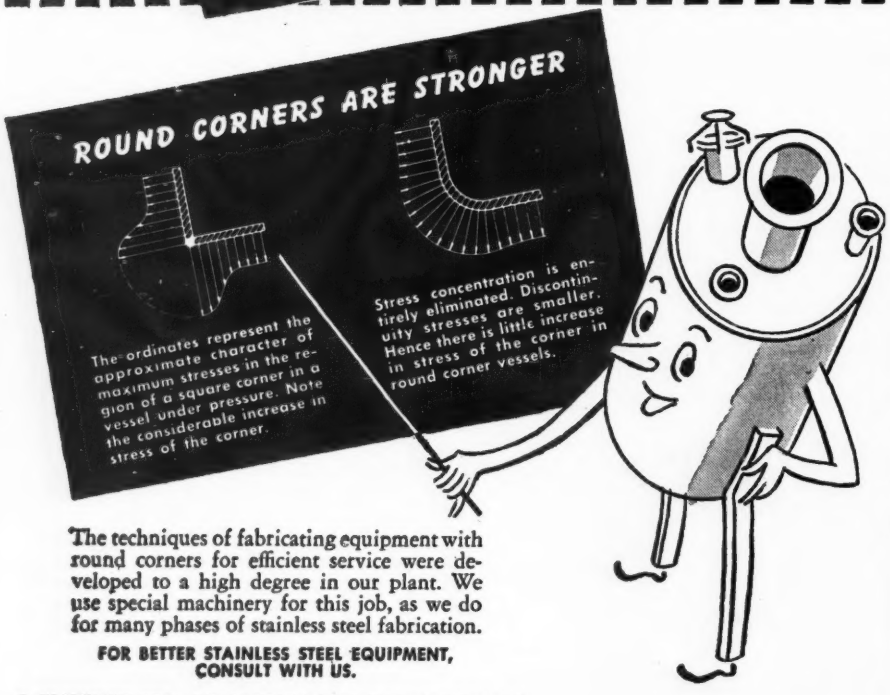
Edward O. Boyer has been appointed president of the Sperry division of General Mills, Inc., succeeding Frank B. Burke, who has retired. Mr. Boyer also was named a vice-president of General Mills.

Lorenzo Cella has assumed the presidency of the newly formed Cella Vineyards Co., one of California's

WHY THEY BUILT ME WITH ROUND CORNERS

Advantages For Your Stainless Steel Equipment Revealed

ROUND CORNERS ARE EASIER TO CLEAN
Even the best brushes require extra time to clean accumulations gathered in square corners. With gummy material or material that hardens, complete removal may never be possible.
In Blickman round corner construction the brush has no difficulty in cleaning the entire surface of the round corner. This saves time and reduces the danger of contamination and corrosion.


ROUND CORNERS ARE STRONGER
The ordinates represent the approximate character of maximum stresses in the region of a square corner in a vessel under pressure. Note the considerable increase in stress of the corner.
Stress concentration is entirely eliminated. Discontinuity stresses are smaller. Hence there is little increase in stress of the corner in round corner vessels.

The techniques of fabricating equipment with round corners for efficient service were developed to a high degree in our plant. We use special machinery for this job, as we do for many phases of stainless steel fabrication.

FOR BETTER STAINLESS STEEL EQUIPMENT, CONSULT WITH US.

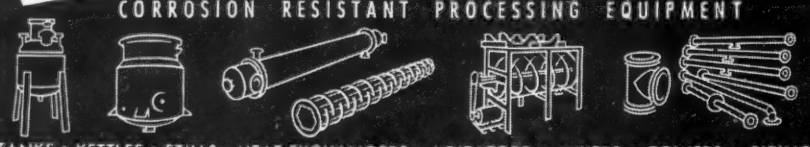
S. BLICKMAN, INC., 4112 GREGORY AVE., WEEHAWKEN, N. J.

S. BLICKMAN, INC.
Guards Alloys in Fabrication

SEND FOR THIS VALUABLE BOOK

A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

CORROSION RESISTANT PROCESSING EQUIPMENT



TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

R. G. BRIERLEY

The Soy Flour Association in Chicago has announced the election of R. G. Brierley to succeed E. J. Dies as president of the Association. Mr. Brierley is manager of the Soya Products Division of the Archer-Daniels-Midland Co. and the Commander-Larabee Milling Co. of Minneapolis. He was a member of the Soy Flour Advisory Committee of WFA.

largest viticultural operations. Mr. Cella, one of the founders of Roma Wine Co., will be assisted by his son, John B. Cella, in managing the new company.

Dr. W. E. Dove has resigned from the Bureau of Entomology and Plant Quarantine to join the insecticide department of Dodge and Olcott, Inc., New York. He will have charge of the company's unit of entomological research.

Arthur E. Gibbs, advisory technical director of the Pennsylvania Salt Manufacturing Co., and the firm's first director of research, has retired, to return to his home in England.

Major M. E. Highlands, formerly in charge of the dehydrated foods section, Quartermaster Corps Subsistance Research and Development Laboratory, Chicago, has resumed his work as food technologist for Friend Bros., Inc., Melrose, Mass.

Bernard T. Malter has been named general production manager in charge of all production, research and laboratories of Flavor Service Corp., Chicago, manufacturers of flavor factors, dry soups and puddings. Mr. Malter formerly was superintendent of the edible division of Glidden Co., Indianapolis.

Gordon W. McBride has resigned his position as principal chemical engineer in the Agricultural Research Administration of the U. S. Department of Agriculture, and has resumed consulting practice in association with Russell S. McBride. He will assist also on the editorial problems of FOOD INDUSTRIES in Washington.

MEMO

Are you investigating Kathanode batteries?

MATERIALS HANDLING SUPERVISOR

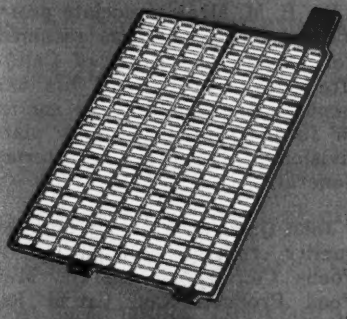
ARE YOUR TRUCKS

MAKING THE GRADE?

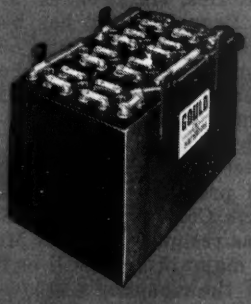
Gould Kathanode power gives your electric trucks extra flexibility. They will climb ramps to loading platforms even when heavily laden. Hoists can be operated while vehicles are still in motion.

Gould Kathanode batteries meet extra power demands. One reason is the special design of the positive grid. Among other features this has double-wedge-type members. There is ample cross-section for conductivity, yet only a knife-like edge is exposed. Peroxidization cannot reduce battery efficiency prematurely.

Investigate Gould power for your electric trucks. Write Dept. **612** for Catalog 100 on Gould Kathanode Glassklad Batteries for Industrial Truck and Tractor Service.



KATHANODE GRID
Cast to a special design, the Kathanode grid retains its power-conducting capacity for the entire service life of the battery.



GOULD STORAGE BATTERY CORPORATION, Depew, N. Y.

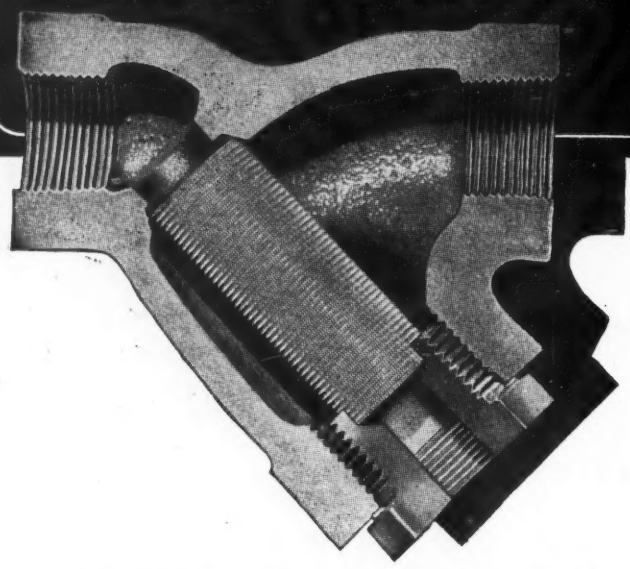
Factories: Atlanta • Boston • Chicago Dallas • Depew • Leavenworth • Los Angeles • North Bergen • Rock Island Saint Paul • Salem • Sioux City Zanesville

GOULD

GLASS-LAD CONSTRUCTION

KATHANODE

It says
"STOP" to Solids—
"GO" to Fluids



A BETTER Strainer to "police your pipelines"

• FIRST—*The Screen*, a high-grade woven Monel wire basket that catches solids—lets condensate, oil or other fluids flow freely.

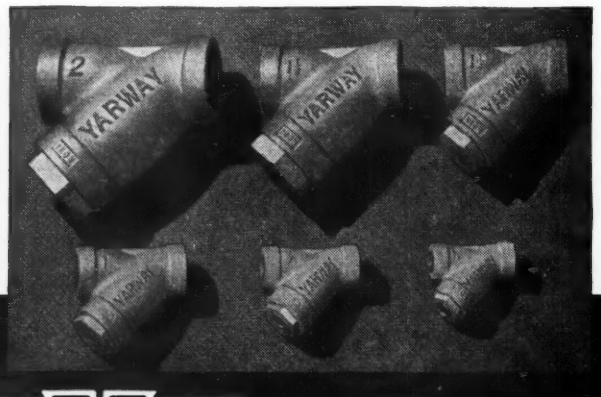
• SECOND—*Finish*. Cadmium plated inside and out for protection against corrosion.

• THIRD—*Easily Cleaned*. Blow-off bushing made for easy removal. Bushing and Screen come out together. Screen automatically aligns on reassembly.

• THOUSANDS IN SERVICE—Sold by over 100 Mill Supply Houses.

6 sizes from ½" to 2" for pressures up to 600 lb. Reasonably priced. See your supply house or write for Bulletin S-200.

YARNALL-WARING COMPANY
100 Mermaid Ave. PHILADELPHIA 18, PA.



YARWAY STRAINERS

LUTHER K. BOWMAN

Announcement has been made of the appointment of Luther K. Bowman as manager of the Juniata plant of Chef Boy-Ar-Dee Quality Foods, Inc., Milton, Pa. Mr. Bowman also is president of the Pennsylvania Canners Association and former partner of Shenk and Bowman, canners at Newville and McAlisterville, Pa.

Dr. E. M. Mrak, associate professor of food technology, has resumed his work at the University of California after having completed his assignment as chairman of the committee on food research, military planning division, office of the Quartermaster General.

John Ormond, formerly chief of the quality control division of Kraft Foods Co., has joined the Midwest Food Products Co., Grand Rapids, Mich., as consulting engineer on production of dried milk, dried ice cream mix, plastic cream and byproducts.

Dr. Lawrence Rosner, formerly chief chemist for the Laboratory of Vitamin Technology in Chicago, is now in charge of the chemical, physical and microbiological assay sections of the National Oil Products Co., Vitamin Laboratories, Harrison, N. J. Dr. J. Albert Reynolds, who has been technical director of vitamin oil operations for Atlantic Coast Fisheries Co., also has joined National Oil Products as technical consultant.

Walter F. Silbersack recently was elected president of American Home Products Corp., succeeding Knox Ide, who has resigned. One of Mr. Silbersack's major projects will be the direction of the company's $15,000,000 expansion program.

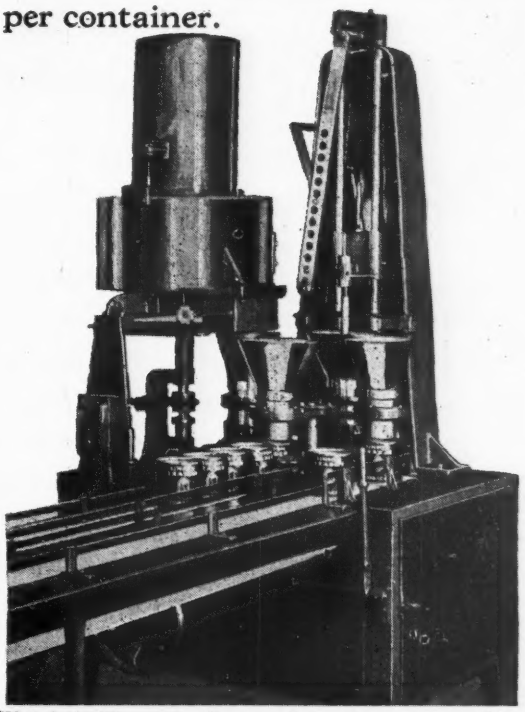
Dr. Bennett T. Simms has been appointed to succeed Dr. Arthur W. Miller as chief of the Bureau of Animal Industry. Dr. Miller retired after 44 years of service with the Bureau.

Dr. Charles R. Stumbo has joined the Process and Product Research Division of Owens-Illinois Glass Co. as supervisor of bacteriology research.

I Was A Problem Child Until WRIGHT'S Developed A Machine To Weigh And Pack Me Automatically . . . . . .

Hard-to-pack material, that's me. Smoking tobacco, dehydrated foods, etc. Consumers wanted me in 4 to 16 ounce tin cans, glass and fibre containers. I had to be weighed and packed by hand. Expensive to handle, I'll say so. And back-breaking for operators, too, particularly when I had to be compressed. Then, just before Pearl Harbor, Wright's Automatic introduced their humidor packer. I was licked. American Tobacco, Brown Williamson, Larus & Brothers, P. Lorillard, and Phillip Morris were among those purchasing the machines. Next, John Morrell & Co. installed and successfully used the humidor packer for weighing and packing dehydrated dog food. Only the War and Wright's all-out Army-Navy production kept the list from growing.

Now Wright's is preparing to resume civilian activity the minute war production schedules permit. Interested parties are invited to send sample material, containers, and data on amount to be packed per container.



Wright's Humidor Packer for automatic weighing and packing. Variable speed from 15 to 50 containers per minute. Write for literature.

Send your packaging problem children to

Wright's Automatic Machinery Co.

300 Calvin Street • **Durham, North Carolina**

"Pioneers Since 1893 In Automatic Packaging Machinery"

IT TAKES but 5 minutes to emulsify a batch of 25-30 gallons of food products with the Case Emulsifier-Homogenizer... 360 gallons an hour!

And the Case Emulsifier-Homogenizer gives you finer emulsions, too! Firmer, more stable products that stand up and keep their freshness longer.

Simple, one-man operation. No delicate adjustments. No kettles. No pre-mixing. No beating mechanism. Stainless steel construction; saves cleaning time.

Send for Bulletin Showing Uses and Formulae • Field Engineers Available

CASE
EMULSIFIER-HOMOGENIZER
A. T. CASE CO. ★ 1532 CALIFORNIA AVE. ★ MONROVIA, CALIF.

Robert I. Tenney has resumed his duties as president of Wahl-Henius Institute, Chicago, after 2½ years in the Chemical Warfare Service. Prior to his becoming technical director of Wahl-Henius in 1939, Capt. Tenney served as assistant brewmaster for Best Brewing Co., Chicago, and brewmaster for Rockford Brewing Co., Rockford, Ill.

J. G. A. Valin has been appointed chief Dominion analyst in the Department of National Health and Welfare in which capacity he will be responsible for the administration of the Food and Drugs Act in Canada.

Warren S. Warner recently was elected vice-president in charge of sales of National Biscuit Co. He has been with the firm for 32 years.

Dr. G. H. Wilster, professor of dairy manufacturing at Oregon State College, is spending his sabbatical leave at the University of Illinois as chief of dairy manufactures in the Department of Dairy Husbandry where he is doing research on dry whole milk.

DEATHS

Edward J. Barry, 82, former plant manager of the Libbey Glass Division of Owens-Illinois Glass Co., October 25, in Toledo.

George R. Clark, 82, foreman of Stokely Foods, Inc., November 1, in Indianapolis.

Dr. C. Houston Goudiss, 64, author of books on foods, and publisher of the magazine Forecast, October 29, in Chicago.

Michael M. Fredel, 73, superintendent of Standard Milling Co., Buffalo, recently.

John Hartley, 82, who developed the Hartley walnut, Napa, Calif., recently.

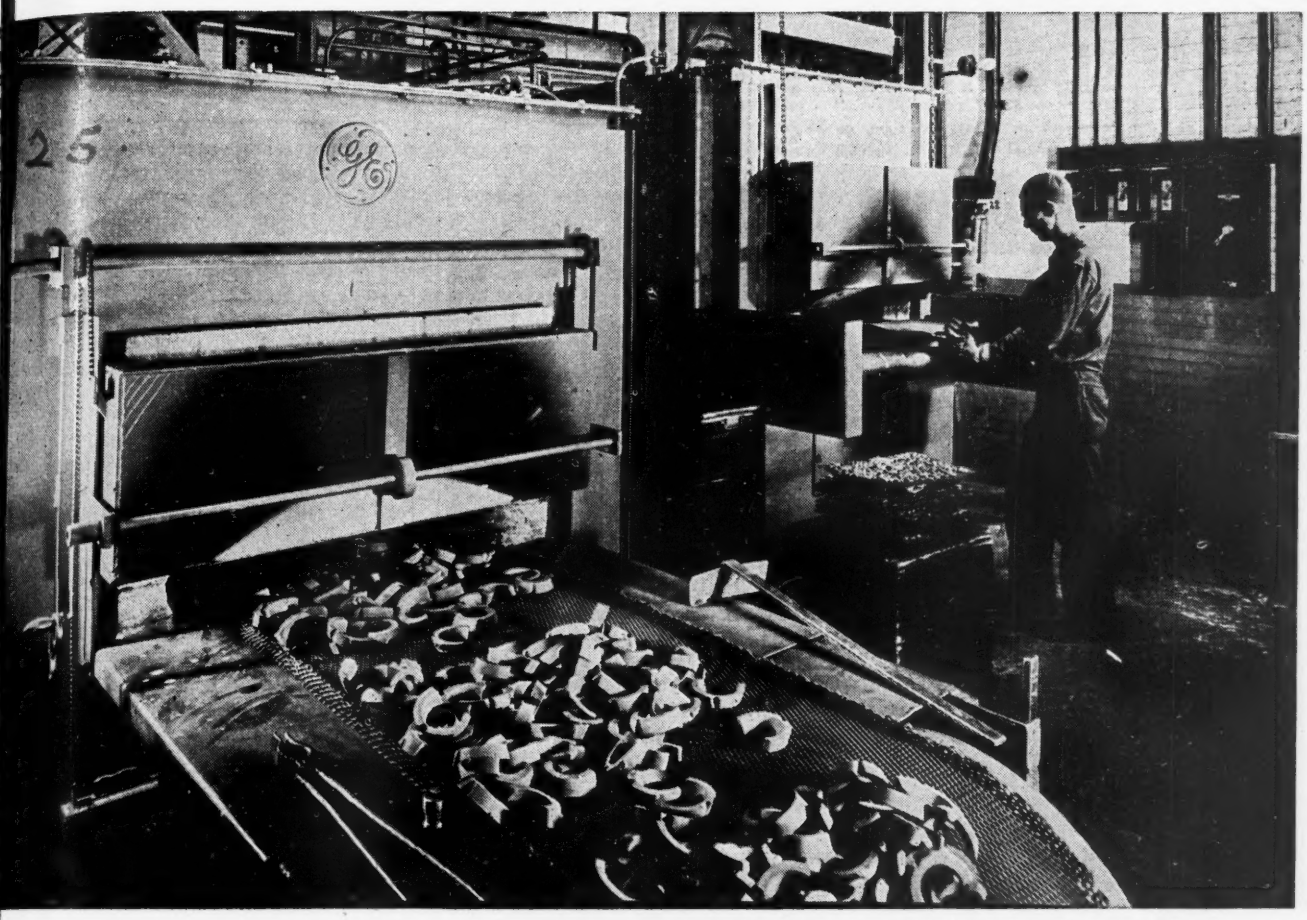
D. F. J. Lynch, director of Southern Regional Research Laboratory, New Orleans, October 15.

Preston McKinney, vice-president of the Canners League of California, October 12, in San Francisco.

Dr. Frederick E. Twining, 71, owner of the Twining Laboratories, Fresno, Calif., October 10.

Frank W. Weyher, 87, former vice-president of the David Stott Flour Mills, November 8, Detroit.

Ernest White, 57, manager of the purchasing department of Quaker Oats Co., Chicago, recently.



Photograph courtesy of The Indiana Steel Products Co., Chicago, Ill.

PRECISION PARTS BY THE MILLION

The making of high quality permanent magnets calls for skilled craftsmanship, proper blending of magnet steels and alloys—and precise temperature control in heat treating processes.

The Indiana Steel Products Company—the world's largest exclusive manufacturer of permanent magnets — has been using Wickwire Spencer Metal Conveyor Belts for years. The furnace shown above operates at a temperature of 1200° F. and uses a Wickwire Belt 24" wide, 49½ feet long with a 1" high turned up guard edge.

Wickwire Spencer Metal Conveyor Belts serve scores of industries. Each belt is *custom-engineered,* some to operate efficiently at sub-zero temperatures, others to carry loads at temperatures up to 2100° F. They are fabricated of any metal capable of being drawn into wire and to give long service under corrosion, abrasion, and other destructive forces.

If you have a conveyor belt problem our engineers will be happy to cooperate in its solution. Send for our illustrated catalog showing types and advantages of numerous conveyor belt constructions. Address Mechanical Specialties Division, Wickwire Spencer Steel Company. Sterling Street, Clinton, Mass.

WICKWIRE SPENCER METAL CONVEYOR BELTS ARE BEING USED IN

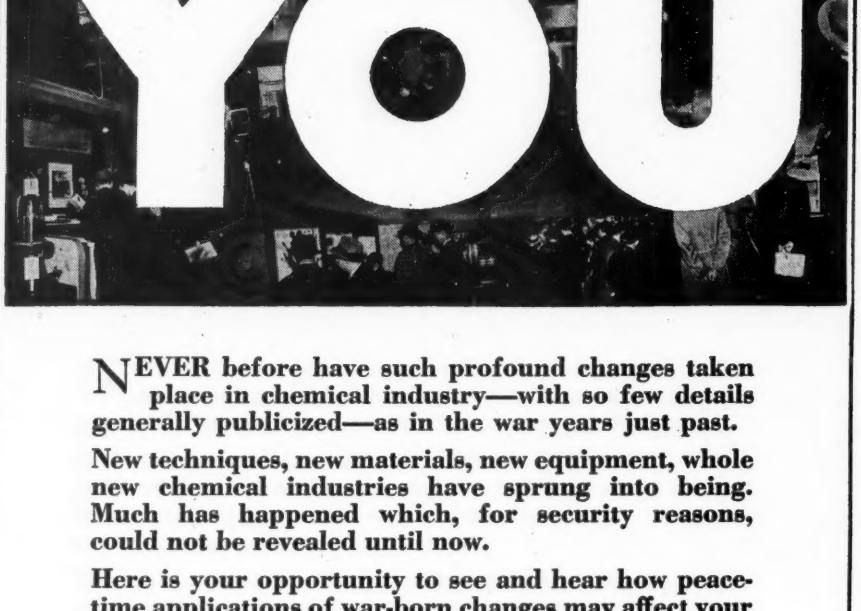
Annealing Ovens	Chemical Processing	Canning	Frozen Foods
Baking Ovens	Decorating Glass	Dehydrating Food	Hardening Furnaces
Brazing Furnaces	Ceramic Products	Degreasing	Infra-Red Drying

WICKWIRE SPENCER STEEL COMPANY

EXECUTIVE OFFICES—500 FIFTH AVENUE, NEW YORK 18, N. Y.

Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Clinton (Mass.) • Detroit • Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester

how chemistry's war-born progress affects



NEVER before have such profound changes taken place in chemical industry—with so few details generally publicized—as in the war years just past.

New techniques, new materials, new equipment, whole new chemical industries have sprung into being. Much has happened which, for security reasons, could not be revealed until now.

Here is your opportunity to see and hear how peacetime applications of war-born changes may affect your plants, your markets, your profits. It's the 20th Exposition of Chemical Industries, which will be held at Grand Central Palace in New York City, February 25—March 2, 1946.

What you will see at the exhibits, what you can learn there by talking with exhibitors' technical representatives, may shape your thought and actions for months to come.

For every chemist, chemical engineer, and production head throughout industry, this year's Exposition is—more than ever before—a "must". No executive responsible for the future of any business depending on chemical process, in his own or customers' plants, can afford to pass it up.

20TH EXPOSITION OF CHEMICAL INDUSTRIES
FEB. 25 - MAR. 2
GRAND CENTRAL PALACE
NEW YORK CITY

Attendance will pay you well. Be there with your associates!

Management of
International Exposition Co.

ASSOCIATED INDUSTRIES

Baker Ice Machine Co., Omaha, h announced the appointment of Ster ing F. Smith as general sales ma ager. He previously was manager the Refrigeration Division of Mills I dustries, Chicago.

The Creamery Package Manufa turing Co. is building a modern ste and concrete addition to its La Mills, Wis., plant.

Robert L. Fitts, president of th Southern Advance Bag and Paper C Boston, has been elected president the Paper Bag Institute, Inc. Du ing the war, Mr. Fitts was a membe of the War Production Board Pul Allocation Committee.

Food Machinery Corporation, Sa Jose, Calif., has announced the ap pointment of William de Back, a vice president of the corporation, as man ager of the Anderson-Barngrover Division. He succeeds Frank J. Bur rell, who recently retired after con tributing 53 years to the canning an food processing industry.

Dr. Francis C. Frary, director research of Aluminum Company America, has been elected to receiv the Perkin Medal in recognition his outstanding accomplishments i the field of industrial research. An nouncement was made by Cyril S Kimball, Secretary of the America Section of the Society of Chemical Industry.

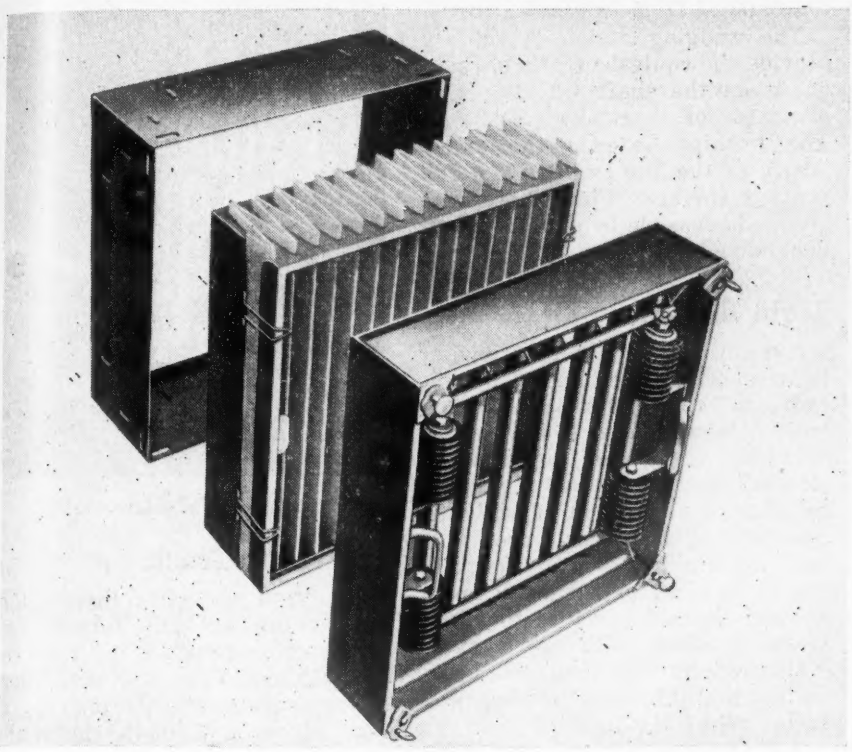
Warren F. Keller, formerly mill su perintendent of B. A. Eckhart Milling Co., Chicago, now is with the Basic Industries Division of Allis-Chalmers Manufacturing Co., Milwaukee.

Monsanto Chemical Co., St. Louis, will soon begin construction of the world's first large scale plant for the manufacture of synthetic caffeine. The new $1,500,000 production facility will be in St. Louis and will utilize an improved process whereby the synthetic material is derived from nitrogen and hydrogen.

The Pfaudler Co., Rochester, N. Y. recently elected Mercer Brugler president to succeed W. D. Pheteplace who has retired. Mr. Brugler has been vice-president and general manager of the company since 1939.

Winthrop Chemical Co., Inc., through its president, Dr. Theodore G. Klumpp, has announced the appointment of Lt. Col. Joseph G. Noh as vice-president in charge of sales and promotion. Before entering the army, Col. Noh was vice-president of McKesson and Robbins, Inc., in charge of the wholesale divisions in St. Louis and Wichita, Kan.

FOOD EQUIPMENT NEWS



Electronic air filter

Electronic Air Filters

Rated at 90 percent or better efficiency with atmospheric dust or smoke, an electronic air filter having an electrostatically charged paper dust collector is announced by American Air Filter Co., First and Central Ave., Louisville 8, Ky. The above efficiency is obtained at the normal velocity of 35 f.p.m. through the "Airmat" media and at the standard rating of 1,000 c.f.m. per 24x24-in. unit. The filter is said to weigh 40 percent less than electronic filters having metal-plate collectors and to require 30 percent less floor area.

The filtering media is composed of a number of plies of porous, tissue-like sheets formed of short cellulose fibers in "jack-straw" arrangement. When an electrostatic charge is applied, the plies tend to separate, each fiber becoming a collecting electrode. This unit is also said to be highly efficient as a mechanical filter. So if the power is off, it affords ample protection against the infiltration of dust due to "stack effects" in air conditioning systems.

Total power consumption is approximately 220 watts at 110 volts.

When the filter paper has accumulated its dust load, it is removed and replaced with clean material by turning a crank in a mechanical loader which automatically folds the paper into the serrated base section of the filter unit. Spare cells loaded with clean paper can be provided for convenience in servicing.

Lime-scale Control

THE problem of inhibiting slime growth and controling the formation of lime-scale deposits in evaporative condensers is said to be successfully met by a new chemical compound announced by Oakite Products, Inc., 26G Thames St., New York 6. It is a white powder which is completely soluble, odorless and nontoxic. It is said to solubilize lime and to have fungistatic and detergent properties.

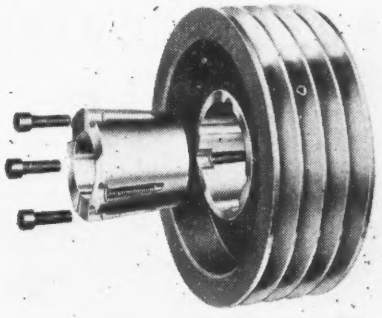
Resorcinol Adhesive

RESORCINOL adhesives which set at room temperature and develop high joint strength have been placed on the market by Resinous Products & Chemical Co., Philadelphia, Pa. Known as Amberlite PR-115, this adhesive material is suited to bonding applications where speed of cure, good adhesion to relatively impervious surfaces, good gap-filling qualities and the ultimate in durability are important requirements, the manufacturer claims. It originally was developed for gluing wood to wood, but shows good adhesion to laminates, rubber and transparent plastics.

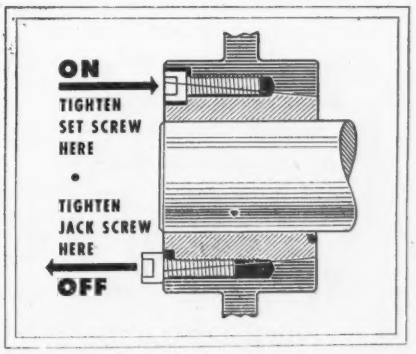
Handy V-Belt Sheave

A V-BELT sheave announced by Dodge Mfg. Corp., Mishawaka, Ind., is said to be quickly mounted and demounted. To install it, it is only necessary to slip the sheave and the bushing assembly onto the shaft and tighten two or three locking screws. These screws are in threaded engagement with the sheave hub and free in the bushing groove. As the screws are tightened, they push against the tapered bushing, forcing it into the tapered hub. This causes the bushing to contract and wedge between the hub and shaft on which it is installed.

To remove the sheave from the shaft, the locking screws are removed and one or two of them are inserted in jack-screw holes which are partially in the bushing and



Exploded view of V-belt sheave.



Method of mounting and demounting.

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is completely automatic! Automatic from raw, unpeeled potatoes to finished product. Peeling, slicing, washing, drying, frying and salting . . . all are under perfect control. You can't beat a Ferry Potato Chip Machine.

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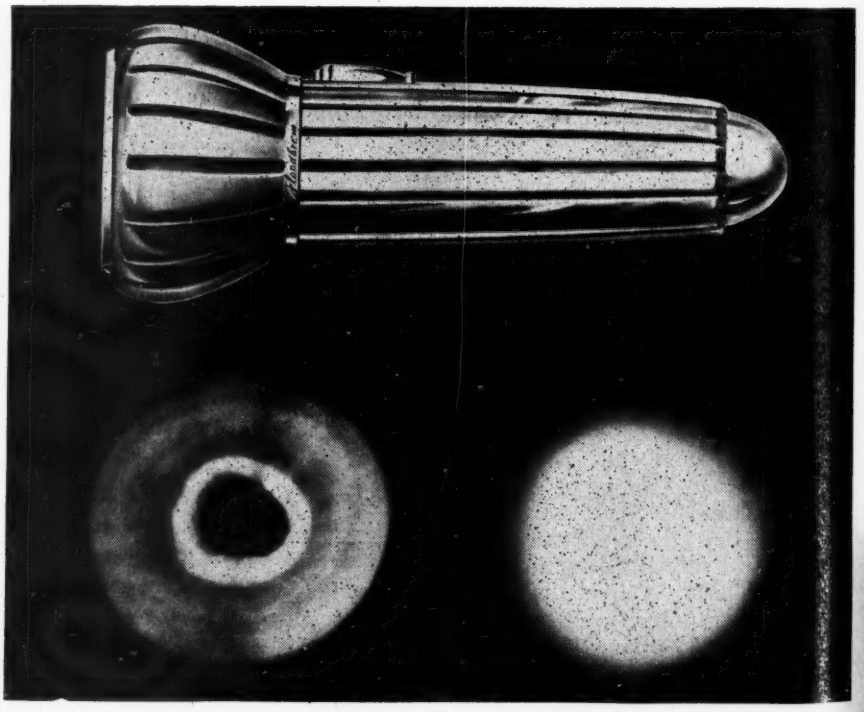
partially in the hub. The portion of the jack-screw hole in the bushing is threaded and that in the hub portion is unthreaded. As the screws are tightened, the bushing is dewedged and the sheave is free for removal from the shaft.

The wedging action is said to provide the equivalent of a shrunk-on fit on the shaft whether it is standard or normally undersize. The bushing extends the entire length of the hub to provide a full bearing surface. Close mountings are made possible by elimination of flanges and collars.

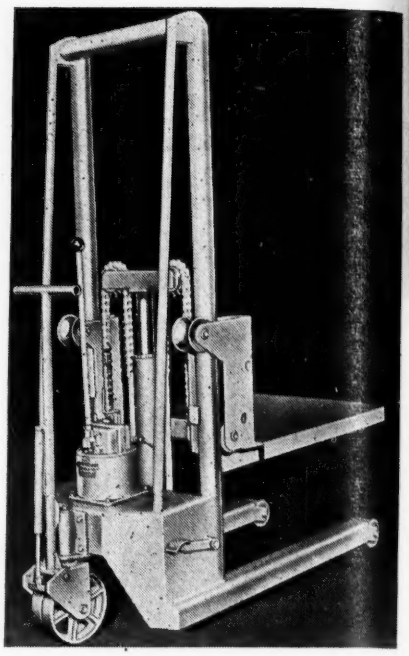
Light Reflector

BY means of a new principle of light reflection, the General Detroit Corp., 2270 E. Jefferson Ave., Detroit 7, Mich., claims to have eliminated the "dark spot" produced by conventional reflectors. The new reflector is used in flashlights, searchlights, lanterns, spotlights and floodlights of all sizes and types. In place of a smooth finish —which is said to cause the light beams to clash with one another —this reflector has a surface broken into multiple diamond shapes to reflect all of the light.

A flashlight employing this principle called the "Floodbeam," has been placed on the market by the corporation. The illustration shows a beam from a conventional flashlight with the usual "dark spot" (left) and a beam with this spot eliminated.



Flashlight which projects a uniform beam (right) as contrasted to conventional beam with dark spot (left).



Hydraulic high-lift truck.

Hydraulic Truck

EMPLOYING the same light-weight welded tubular and formed-plate construction used in its 1,000-lb.-capacity unit, Lyon-Raymond Corp., 2388 Madison St., Greene, N. Y., has added a 2,000-lb. hydraulic, high-lift truck to its line. The truck is suitable for transferring materials as well as for stacking and tiering. The standard stock model has a platform 30 in. wide by 36 in. long with an elevating range of from 6 in. to 60 in. above the floor. Ease of movement is provided by

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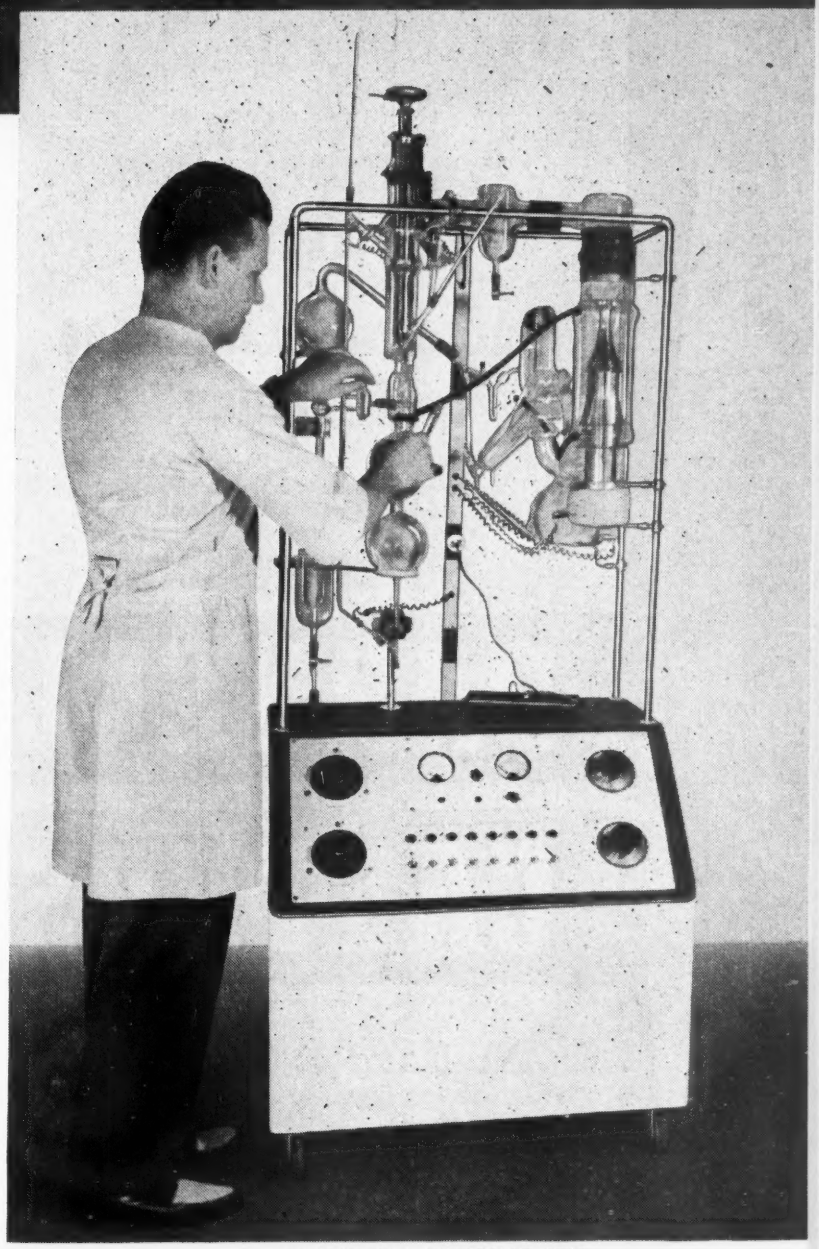

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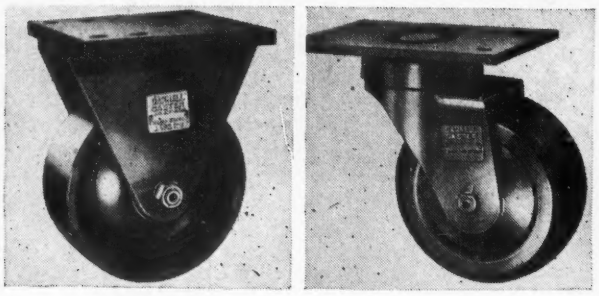

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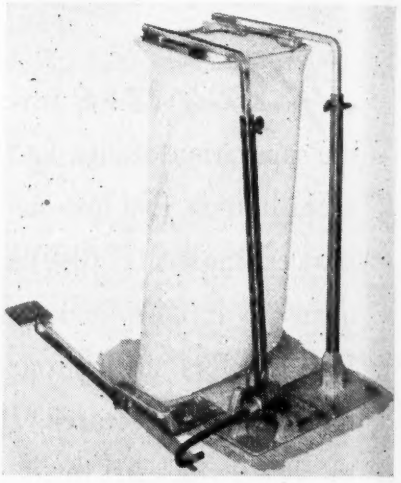
Bag Holder

A BAG HOLDER that can be mounted either flush with the floor or on a platform scale—particularly useful in bagging grain, feed or potatoes—is made by Seedburo Equipment Co., 223 W. Jackson Blvd., Chicago 6. When a bag is filled, it is released by means of a foot lever, leaving both hands free. The bag is removable from three positions, either left side, right side or front. The height of the jaws is adjustable to the length of bag (from 27 in. to 40 in.). For bags less than 27 in. long, a portable platform can be placed under the bag for proper height. The unit is adjustable for any width bag. The bag holder is sturdy in construction, all castings being made of aluminum. Shipping weight is about 18 lbs.



Bag holder, showing floor mounting.

Fire-repelling Paint

PAINT which protects wood and other materials against fire, and which is approved by Underwriters, is announced by General Detroit Corp., 2270 E. Jefferson Ave., Detroit 7, Mich. It is shipped as a concentrated paste. After dilution, it can be applied with a brush or spray gun to the surface to be protected. One concentrated gallon at standard dilution is said to cover as much as 185 sq. ft. with two coats. Standard color is bone-

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white, but tints may be easily added.

The manufacturer states that in a recent test made by the Portland, Ore., fire department, two identical wood structures were subjected to fires of burning oil. One painted with their Fi-Repel suffered only minor charring, while the untreated one burned to the ground in less than 25 minutes.

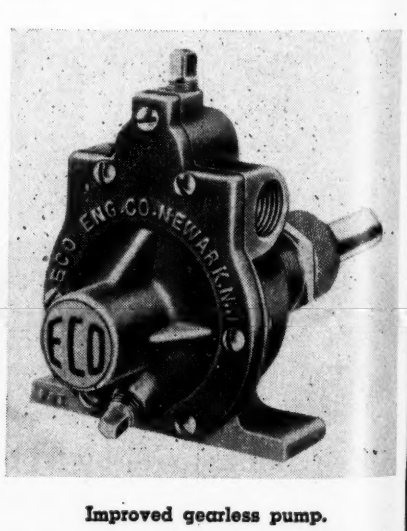
Fire-repelling paint.

The illustration shows physician's tongue depressor, one end of which is coated with this paint. The unpainted end burns freely, but the flame dies when it reaches the painted portion.

The paint is available in 1-, 5- and 55-gal. containers.

Gearless Pump

AN improved gearless pump for water, light oil or other liquids has been introduced by Eco Engineering Co., Dept. 42, 12 New York Ave., Newark 1, N. J. One feature of the new pump is that it is equipped with special bearings which require only water lubrication.



Improved gearless pump.

CATALOGS, BULLETINS

FOOD PLANT EQUIPMENT

General Equipment — Ingersoll-Rand Co., 11 Broadway, New York 4, announces publication of a 16-page, two-color catalog. It is illustrated with many installation views of the company's products. The compressor section displays machines ranging from the small, air-cooled to the large 3,000-hp models. Special purposes, such as high-pressure refrigeration, and applications requiring nonlubricated cylinders are featured. Reciprocating vacuum pumps also are represented, and several pages are devoted to centrifugal pumps of all sizes. Ejectors, barometric condensers and the process of water-vapor refrigeration are illustrated in an instructive manner.

Thawing Pits—Bulletin No. 1040, published by Hauck Mfg. Co., 124 Tenth St., Brooklyn 15, N. Y., describes a radiant method of heating coal car hoppers to thaw frozen coal.

Vacuum Cleaners—Industrial vacuum cleaners are described and illustrated in a bulletin published by the Allen Billmyre Co., 431 Fayette Ave., Mamareneck, N. Y. Dimensions, capacity, power, performance and weights are given for all models and sizes.

High-Vacuum Pumps — The principle of Kinney high-vacuum pumps is illustrated in a 24-page booklet published by the Kinney Manufacturing Co., Boston 30, Mass. Photographs show various features of the equipment, and drawings illustrate the cycle of operation.

Steam Generator—C. H. Dutton Co., Kalamazoo, Mich., has published a three-color, fully illustrated bulletin describing its 150-hp. Econotherm steam generator, a self-contained, automatic unit. Illustrations show the fire travel through three passes, the induced draft principle and the fast-firing features. It is designed for oil or gas firing.

Dairy Industry Equipment — Reynolds Electric Co., 2650 W. Congress St., Chicago 12, Ill., has issued a bulletin covering equipment for the dairy industry. Among the items described and illustrated are refrigerator fans, processing room air circulators, food and drink mixers.

Industrial Buyers' Bulletin—Precision Equipment Co., 32 No. State St., Chicago, Ill., has published an Industrial Buyers' Bulletin listing equipment ordinarily difficult to obtain but which this firm has in stock for immediate delivery. Net wholesale prices are shown for all items, among which are steel toolroom units, fans, slide rules, micrometers, counting scales, time switches, inverters, grinding tools, tool chests and wire strippers.

Steam Boilers—Catalog 96 "E"—a 20-page, four-color punched booklet—has been released by Kewanee Boiler Corp., Kewanee, Ill. In it are illustrated and described steel-riveted firebox boilers built for 100, 125, or 150-lb. steam working pressure. They are made for any fuel, either hand or mechanically fired. Capacities range from 10 to 300 h.p.

CONTROL EQUIPMENT

Electronic Controls—A bulletin showing many types of electronic controls has just been made available by Lumenite Electronics Co., 407 So. Dearborn St., Chicago 5, Ill. In it are shown a number of actual installations of liquid-level controls (both electric-conducting and nonconducting liquids). Actual wiring diagrams and operation sequences are given to illustrate both types of installations. Also shown are a variety of switches for timing operations including daily and weekly program time clocks.

pH and Chlorine Control.—W. A. Taylor & Co., 7300 York Road, Baltimore 4, Md., has revised its combination handbook and catalog. It now contains both simple and technical explanations of the meaning of pH control as well as specific discussions of the applications of pH, chlorine and phosphate control in 35 industries. It also covers the precautions to be observed in making determinations.

Coordinating Equipment — Equipment for coordinating processing operations in the food industries is covered in a 24-page booklet issued by General Electric Co., Schenectady, N. Y. In it are described a general line of motors, motor controls and coordinated drives, electric heating units and devices, as well as numerous other types of equipment.

Analytical Instruments—Beckman Instruments, a division of National Technical Laboratories, South Pasadena, Calif., has available for distribution a number of bulletins describing and illustrating analytical instruments. In it are included laboratory and industrial pH meters, automatic pH indicators, infrared and ultraviolet spectrophotometers and other instruments.

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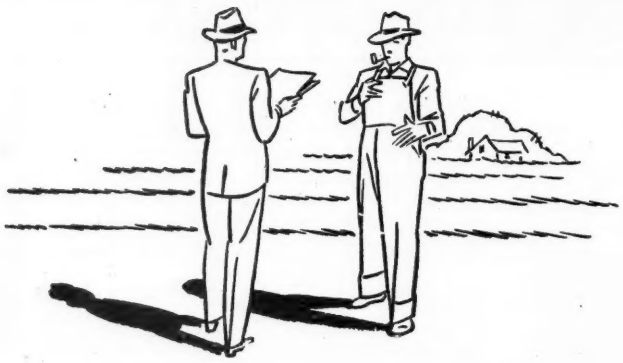

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BOOKS

Cereal Crops

WORLD GRAIN REVIEW AND OUTLOOK. By Helen C. Farnsworth and V. P. Timoshenko, with a statistical appendix by Rosamond H. Pierce. Published by Food Research Institute, Stanford University, Calif., 1945. 6¼x9¼ in.; 319 pages. Price, $3.

This book is, in a sense, an outgrowth of the Food Research Institute's annual "Wheat Studies," now discontinued. It utilizes materials and experience accumulated in the writing of those 20 annual reviews, but offers far wider coverage of the world's leading cereal crops.

Emphasis is placed on wheat and rice as the two major food grains of the civilized world. These two grains are treated in their relation to each other and to the lesser grains, over a period of 15 years. This presentation enables the reader to readily evaluate the importance of any one crop in any specified year.

As a result, the book offers an always sharply focused survey of major grain developments, particularly as they relate to supplies, international trade and consumption.

Food Charts

APPROXIMATE NUTRITION VALUE OF COMMON FOODS, Charts I and II. Prepared by Lillian Anderson. Published by Rudolf Schick Publishing Co., 700 Riverside Dr., New York 31, 1945. 3x4 ft., mounted on linen with rollers. Price, $4.75 each.

Chart I gives the calory, protein, calcium and iron values in average servings of 26 common and basic foods. Chart II, using the same foods, presents their vitamin content.

Worked out by the director of nutrition of the New York Community Service Society, in cooperation with other scientists, these charts provide, at a quick glance, information frequently required by the nutritionist.

Vitamin Research

VITAMINS AND HORMONES, Vol. III. Edited by Robert S. Harris and Kenneth V. Thimann. Published by Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y., 1945. 6¼x9½ in.; 420 pages; cloth. Price, $6.50.

This third volume carries on the work of its two predecessors. The material has been gathered from a variety of chemical, physical, biological and medical journals and presents, as usual, critical summaries of the progress of vitamin and hormone research. In the small areas chosen for presentation, a thorough summary is presented.

While this volume, like the first two, may appear to be a series of disconnected articles, the editors point to the many vitamins and hormones that must be viewed from a chemical, biological and clinical aspect. They express the conviction that in successive volumes the subject matter will tend to integrate more and more, until the combined volumes eventually become a complete reference to all active research in the vitamin and hormone field.

Electronic Control

ELECTRONIC EQUIPMENT. By R. C. Walker. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y., 1945. 5½x8¾ in.; 393 pages; cloth. Price, $6.00.

Specific information on the various applications of electronic devices is offered here to the electrical engineer, mechanic and student. It is a simple introduction to the main sections of electronics, outside the field of telecommunication. The author's aim has been to adhere to principles, quoting applications only as illustrative examples. No attempt is made to cite many industrials uses as such.

It is recognized, however, that the use of an electronic device nearly always involves some accessory equipment. Part of the book, therefore, is devoted to apparatus most frequently associated with the electronic control of small mechanisms.

About Spices

THE SPICE HANDBOOK. By J. W. Parry. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y., 1945. 5½x8¾ in.; 254 pages; cloth. Price, $6.50.

Spices—from the ground up—are fully discussed in this handbook, designed for food manufacturers, importers and salesmen.

The properties of barks, rhizomes, fruits, seeds and herbs are dealt with, as are the spice uses as flavors in foods and as adulterants. The book also provides such details as the degree of binding, the weight and style of packaging, and the essential oil content of the spices mentioned.

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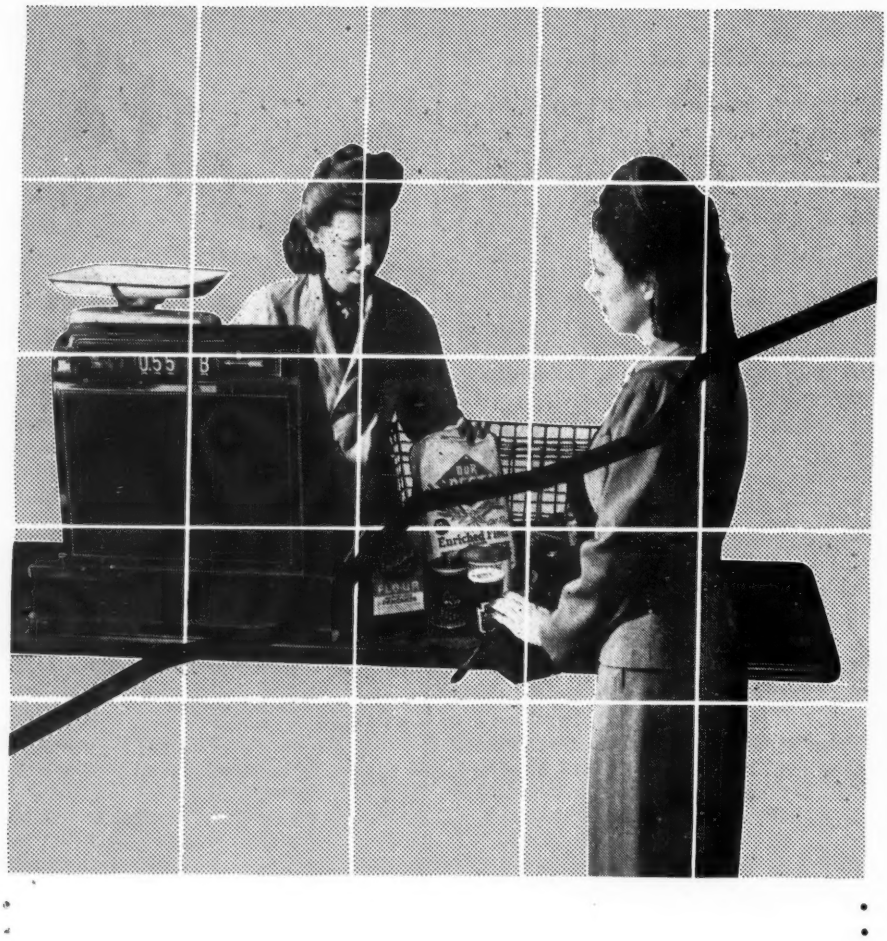

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TRICALCIUM PHOSPHATE
DISODIUM PHOSPHATE
CALCIUM PYROPHOSPHATE
SPECIAL PHOSPHATES
IODIZED MIXTURES

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

The reader should find this book a help in recognizing and accurately identifying the various spices, seeds or herbs. He will also learn something of the pure foods laws as they pertain to the subject, and of the provisions of the Spice Trade Association.

Research

ORGANIZATION OF TECHNICAL RESEARCH IN INDUSTRY. Published by Industrial Research Institute, Inc., 60 East 42nd St., New York 17, 1945. 6x9 in.; 15 pages; paper. Free.

This short monograph covers the broad principles upon which research in any industry must be based and outlines the organization of an industrial research laboratory. It should be useful where the installation of such laboratories is now contemplated.

GOVERNMENT PUBLICATIONS

FREEZING TO PRESERVE HOME-GROWN FOODS. B. H. C. Diehl and K. F. Warner. U. S. Department of Agriculture, Circular No. 709. Available from Superintendent of Documents, Washington 25, D. C. Price, 15 cents.

FEEDING COTTONSEED PRODUCTS TO LIVESTOCK. Department of Agriculture, Farmers' Bulletin 1179 (rev. 1945). Available from Superintendent of Documents, Washington 25, D. C. Price, 5 cents.

LIVESTOCK, MEATS AND WOOL MARKET STATISTICS AND RELATED DATA, 1944. U. S. Department of Agriculture, Production and Marketing Administration. CS-14. Available on request to Production and Marketing Administration, Washington 25, D. C.

UPGRADING AND INTRA-INDUSTRY TRANSFER SUGGESTIONS FOR OCCUPATIONS IN THE CANNING AND PRESERVING INDUSTRY. War Manpower Commission, Job Family Series No. 1-67. Available from Superintendent of Documents, Washington 25, D. C. Price, 10 cents.

DUST-COUNTING CELLS. By Carlton E. Brown, R. L. Beatty, and T. B. Kirby. Bureau of Mines, Information Circular I. C. 7331. Mimeographed. Available on request to Bureau of Mines, Washington 25, D. C.

A METHOD OF RATING FUMIGATION CHAMBERS FOR TIGHTNESS. By Robert D. Chisholm and Louis Koblitsky. Bureau of Entomology and Plant Quarantine, ET-224. Available on request to Bureau of Entomology and Plant Quarantine, Washington 25, D. C.

PATENTS

CANNING

Liquids Sterilized by Ultra-violet During Filling of Glass Containers—Stewart C. Whitman, deceased, by Helen Whitman, administratrix, New York, N. Y. No. 2,384,778. Sept. 11, 1945.

Mixed Liquid Ingredients Homogenized During Continuous Passage Through Rotary Closed Bowl Fitted With Floating Disk to Regulate Feed Into Bowl and With Lower and Upper Series of Radial Spaced Concentric Plates—John Cecil Rhodes, Jenkintown, Pa., to United Dairy Equipment Co., West Chester, Pa. No. 2,388,573. Nov. 6, 1945.

CEREAL

Grains Freed of Outer Coating by Mechanical Action of Two Individually Driven Screw Agitators Having Same Pitch and Mounted Vertically in Casing Fitted With Top and Bottom End Plates—Enrique Moresco, Buenos Aires, Argentina. No. 2,386,493. Oct. 9, 1945.

DAIRY

Evaporated Milk Contained in Glass Bottles Sterilized by Pre-heating to About 130 Deg. F., Rotating Bottle and Contents in Horizontal Position Under Super-atmospheric Pressure While Bringing Temperature of Milk to Between 255 and 265 Deg. F. in Period Not to Exceed 5 Min. and Cooling by Contact With Fluids of Progressively Decreasing Temperature to Avoid Cracking of Bottles—Randall Whitaker, Robert P. Myers and Robert E. Homberger, to Sealtest, Inc., Baltimore, Md. No. 2,388,103. Oct. 30, 1945.

Ripened Cream Cheese Mix Heated to Between 135 and 170 Deg. F. and Centrifuged for Removal of Whey Preparatory to Packaging—Oscar J. Link, Beaver Dam, Wis., to Kraft Cheese Co., No. 2,387,276. Oct. 23, 1945.

DEHYDRATION

Solids-containing Liquid Dehydrated by Two-stage Spray Drying Method—Julius J. Mojonnier, Winfield, Ill., to Mojonnier Bros. Co. No. 2,387,458. Oct. 23, 1945.

FATS AND OILS

Disaggregated Fatty Material Mechanically Formed Into Compact Body, Given Predetermined Form and Coated With Substantially Uniform Impervious Sheath of Fatty Material—Martin Louis Balzarini, Rockport, Mass., one-fourth to Bennett H. Levenson, Washington, D. C. No. 2,386,775. Oct. 16, 1945.

FRUITS AND VEGETABLES

Fresh Whole Fruit Protected From Decay by Treatment With Alkali-forming Metal Hypochlorite Solution With Solution Containing Reducing Agent and Finally With Solution of Water Soluble Salt of Hydroxy Diphenyl—Arthur F. Kalmar, Riverside, Calif., to Food Machinery Corp., San Jose, Calif. No. 2,386,954. Oct. 16, 1945.

Green Corn Cut From Cob in Machine Equipped With Rotary Knives Which Adjust Position of Cutting Edges According to Diameter of Ear Under Influence of Centrifugal Force—Charles E. Kerr, Hoopeston, Ill., to Food Machinery Corp., San Jose, Calif. No. 2,386,955. Oct. 16, 1945.

MEAT AND FISH

Fish Filled and Compressed Into Cans During Transfer of Cans on Endless Conveyor—Edward M. Borg, Seattle, Wash. No. 2,387,240. Oct. 23, 1945.

Frozen Beef Carcasses Thawed by Heat Transmitted Through Bone Structure—Beverly E. Williams and Leon L. Cadwell, to Industrial Patents Corp., Chicago, Ill. No. 2,387,221. Oct. 16, 1945.

SUGAR AND STARCH

Carbohydrates, Starches, Sugars, Cellulosic and Hemi-Cellulosic Materials Fermented by Clostridium butylobutyricum at Mash Temperatures Not Below 37 Deg. C. and Not Above 43 Deg. C.—Charles Weizmann, London, W. C. 1, England. No. 2,386,374. Oct. 9, 1945.

Impure Sucrose Solution Subjected to Ion Exchange Treatment Until Normal pH of Effluent From Anion Exchange Treatment is Between 4.3 and 7.0, Aerated to Remove CO_2 and Subsequently Alkalized by Sodium Hydroxide to Increase pH to About 8.5—Abraham Sidney Behrman, Chicago, Ill., to Infilco, Inc. No. 2,388,224. Oct. 30, 1945.

Solutions Tested for Reducing Sugar Content by Use of Heat-generating, Gas-evolving, and Acid-containing Tablets Containing Proper Proportions of Anhydrous Alkali Metal Hydroxide and Anhydrous Cupric Sulphate—Walter A. Compton and Joseph M. Treneer, to Miles Laboratories, Inc., Elkhart, Ind. No. 2,387,244. Oct. 23, 1945.

Starch Gelatinization Temperature Reduced by Heat Treating in Presence of Saturated Aliphatic Monohydric Alcohol of 1 to 6 Carbon Atoms and of Water—Thomas John Schoch, La Grange, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,386,509. Oct. 9, 1945.

Sugar Juices and Like Refined and Purified by Method Involving Ionic Exchange—Henry A. Vellez, Bay City, Mich., to Infilco, Inc., Chicago, Ill. Nos. 2,388,194 and 2,388,195. Oct. 30, 1945.

Sugars Polymerized by Use of Neutral Metal Salt as Catalyst During Heating Under Substantially Anhydrous Conditions—Gerald J. Leuck, Evanston, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,387,275. Oct. 23, 1945.

Sugar Solutions and Like Purified by Method Involving Use of Active Carbon and Ionic Exchange—Abraham Sidney Behrman, Chicago, Ill., to Infilco, Inc. Nos. 2,388,222 and 2,388,223. Oct. 30, 1945.

MISCELLANEOUS

Coffee, Nuts, Beans and Grains Roasted in Continuous Manner—Thomas J. Stephens, New York, N. Y., to Frederick W. Ludwig, trustee for Thomas J. Stephens, Henry A. Rudkin and Frederick W. Ludwig. No. 2,388,298. Nov. 6, 1945.

Non-pectous Constituent in Pectous Source Material Removed by Yeast Fermentation Preparatory to Recovery of Pectin—Herbert S. Bailey, Ontario, Calif., to California Fruit Growers Exchange, Los Angeles, Calif. Nos. 2,387,635 and 2,387,636. Oct. 23, 1945.

Pectin Treated With Ionizable Salt of Alkali Metal, Alkaline Earth Metal, or Ammonium to Obtain Alkaline Deesterification—Hans Lineweaver and Rolland M. McCready, Berkeley, Calif., to the United States of America. No. 2,386,323. Oct. 9, 1945.

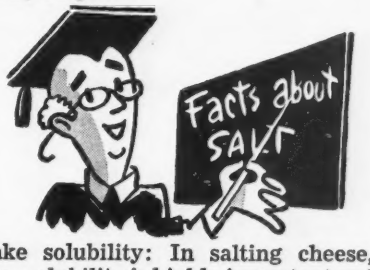
Ravioli Made by Semi-mechanical Means—Mario Valdastri, Sr., Kailua, Island of Oahu, Territory of Hawaii. No. 2,386,993. Oct. 16, 1945.

Riboflavin Recovered From Nutrient Mash Fermented by Eremothecium ashbyii by Adjusting pH of Mash and Digesting Further With Acid-producing Bacteria—George E. Hines, Jr., to Commercial Solvents Corp., Terre Haute, Ind. No. 2,387,023. Oct. 16, 1945.

Yeast Hydrolyzed With Caustic Alkali and Subsequently Neutralized, Filtered, Treated With Water Soluble Calcium Salt and Acidified to Form Precipitate of Calcium Nucleate Which is Further Treated to Obtain Nucleic Acid—Sutton

TELL US MORE *Teacher!*

● Maybe you're like a lot of food technologists and salt buyers who have gone along thinking all salt is the same. Actually, of course, various brands and grades and grains of salt differ in many respects.



Take solubility: In salting cheese, slow solubility is highly important and desirable. Otherwise, salt is lost in the whey, producing flat, under-salted cheese. On the other hand, in salting butter, salt must dissolve with lightning speed. If the butterfat is on the soft side—lacking in body—at certain seasons, butter salt must dissolve so quickly that over-working is avoided. Otherwise, the butter may lose its desirable physical properties and become mottled or marbled—and may lose its moisture, become leaky. Yet, if the salt is not properly dissolved, the butter may be gritty.

To meet these problems, we have set up definite solubility standards for Diamond Crystal Salt. Our Butter Salt, for example, dissolves completely in water at 65° F. in less than 9.8 seconds—average rate, 9.2 seconds. That is why so many quality-minded food processors have learned to depend on Diamond Crystal products, manufactured under strict quality-control standards for solubility rate.

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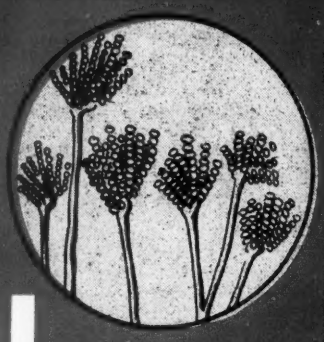
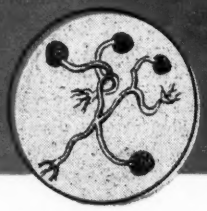
If salt solubility enters into your processing, write to our Technical Director. He will gladly recommend the correct Diamond Crystal Salt for best results. Diamond Crystal, Dept. J-12, St. Clair, Michigan.

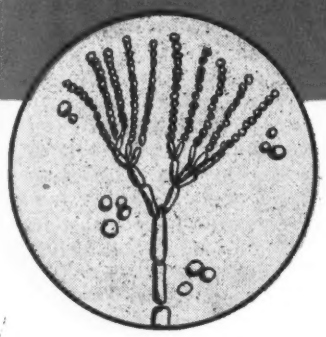
DIAMOND CRYSTAL ALBERGER PROCESS **SALT**

Here is a NEW answer to

MOLD CONTROL







HERE are three of the many trouble-causing varieties of mold. They are commonly encountered in cold storage plants, food plants, proofing rooms of baking establishments and many other places. Wherever found mold growths are a constant threat to product quality.

But a NEW answer for the control of mold on surfaces of walls, ceilings, floors and certain equipment is now available. It is a NEW specially designed material in powder form known as

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Due to its potent germicidal and fungistatic activity, a solution of Oakite TRI-SAN, applied to surfaces with cloth or brush inhibits and controls the growth of mold organisms such as aspergillus, Penicillium and Rhizopus. Safe to use, highly effective, extremely economical, we invite you to make tests of Oakite TRI-SAN and see for yourself how successfully it combats mold growth.

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Redfern, Bronx, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,387,040. Oct. 16, 1945.

Zein-containing Proteins Prepared Directly From Corn Gluten—Roy E. Coleman, Chicago, Ill., to Time, Inc. Nos. 2,388,388 and 2,388,389. Nov. 6, 1945.

U. S. Patents Available For Licensing or Sale

Further information concerning these patents is obtainable from the U. S. Patent Office, Washington, D. C. They should be identified by their Register Number as well as by their Patent Number. Names given are those of owners of the patents.

Eggs Kept Fresh by Relatively Small CO_2 Content Produced Naturally or Added—Cornell Research Foundation, Cornell University, Ithaca, N. Y. No. 1,868,996, granted July 26, 1932, and No. 1,922,143, granted Aug. 15, 1933. Register Nos. 452 and 453.

Concentrated "Brunswick Stew" with Low Moisture Content Made Substantially Fat-free to be Eaten in Flat Cake or Cracker Form or Converted Into Stew and to be Packaged in Paper Cartons, Shipped Anywhere and Stored for Long Periods—Annie R. C. Owen, 2719 Ontario Road, N. W., Washington, D. C. No. 1,911,463; granted May 30, 1933. Register No. 535.

Materials of Different Colors Stuffed Into Sausage Casings in Elongated Layers and in Contrasting Cross Sections—Eugene Wengel, 5099 Nottingham Road, Detroit, Mich. No. 1,947,541; granted Feb. 20, 1934. Register No. 302.

Honey Made to Have Fine Crystalline Texture to Spread Like Butter Without Dripping—Cornell Research Foundation, Cornell University, Ithaca, N. Y. No. 1,987,893; granted Jan. 15, 1935. Register No. 446.

Sherry Wine Made from Eastern Concord Grapes on Short-time and Low-cost Basis—Cornell Research Foundation, Cornell University, Ithaca, N. Y. Nos. 2,181,838 and 2,181,839; granted Nov. 28, 1939. Register Nos. 447 and 448.

Juice Pressed from Sugarcane in Field by Portable Mill Complete with Power and Juice-Storage Facilities—Lenis J. Moss, Henry, La. No. 2,244,209; granted June 3, 1941. Register No. 477.

Coating on Frozen Confection Scored to Divide Surface into Predetermined Areas to Limit Splitting and Shelling-off of Coating During Eating—Eugene R. Weisbender, 2330 Davue Circle, Dayton, Ohio. No. 2,288,970; granted July 7, 1942. Register No. 536.

Cut or Chopped Foods Dried at High Temperatures Without Scorching While Being Thrown Against Removable, Fexible, Porous Side Walls of Bowl-shaped Container Rotating in Constant Contact With Hented Rolls—Elmo H. Williams, 1222 E. Calanevus St., Altadena, Calif. No. 2,361,894; granted Oct. 31, 1944. Register No. 484.

Fish Cleaned With Knife Made to Have Sharp-pointed Blade and Bow-shaped Device With Gripper Teeth To Hold Fish During Skinning — Joseph T. Stokes, No. 14A South Ohio Ave., Atlantic City, N. J. No. 2,364,250; granted Dec. 5, 1944. Register No. 528.

Lactose Made in Stable Crystalline Anhydrous Alpha Form—Cornell Research Foundation, Cornell University, Ithaca, N. Y. No. 2,319,562; granted May 18, 1943. Register No. 445.

Meat Ground in Self-feeding Magazine-type Machine Enclosed to Keep Out Dust and Insects and Refrigerated With Coils in Base—Curtis O. Ness, 2150 S. Ogden, Denver, Colo. No. 2,333,669; granted Nov. 9, 1943. Register No. 431.

Shortening With High Emulsifying Power and High-fat Pastries Made From Jojoba Nut Oil or Derivatives—Ilona Taussky, % Michael S. Striker, 500 Fifth Ave., New York, N. Y. No. 2,350,082; granted May 30, 1944. Register No. 261.

Letters to the Editor

Salaries Set by Law Of Supply and Demand

To the Editor
OF FOOD INDUSTRIES:

THE article, "Salaries for Food Technologists," is one which deserves consideration, whether or not one shares the writer's views. That dissatisfaction exists today not only among food chemists, but among many working chemists in America, is no secret, and an open discussion of their problems should help to clear the atmosphere.

So far as salaries are concerned, I am afraid the author overlooks the important fact that prices paid for technical brains, like all other prices, are governed by the law of supply and demand—than which no law is more inexorable. When demand tops the supply, prices rise and when the supply overlaps the demand, prices fall. Even the Gestapo in Germany could not prevent a blackmarket in foodstuffs, nor could the unions prevent declining wages during the depression of the early thirties. True, the law of supply and demand may be temporarily suspended by strong-arm methods, but such a suspension is always frought with danger, and eventually must fail. To rail against the greediness of employers, therefore, or against the indifference of technical societies, serves no useful purpose. Even if a generous-minded employer were willing to pay more than the market, competitive pressure would soon force him to go back to the prevailing price level.

I fully agree with the author in his statement that respect and money go together, and I am heart and soul with him on his gripe against application blanks which ask not pertinent, but impertinent questions. Since Freudian psychiatrists have invaded America, they have set themselves up as arbiters of human fates, and in order to justify the well-paid positions they hold, are trying to impress common mortals by absurd questionnaires. In our own organization we ask applicants only one question: "Do you think you can do the work?" That, after all, is what we hire people for. We never inquire about any of their private affairs. I, for one, have always felt, when inclined to ask a prospective woman-employee whether she was married, that she had much more right to ask me that question, and that when I expressed curiosity about an applicant's financial condition, he would be more justified in asking me if we met our payroll regularly. Here is where the technical societies really could use their persuasive powers to good advantage, because I fully believe that most top executives are unaware of the mental cruelties their employment departments are guilty of in their endeavor to be perfect pickers.

We all know that technical services are underpaid in comparison with salesmanship, but squawking will do no good. The way for chemists to remedy this situation is to change to greener pastures, which is not half as difficult as it is painted to be.—*Otto Eisenschiml, Manager, The Scientific Oil Co., Chicago, Ill.*

Technical Man Must Sell Himself

To the Editor
OF FOOD INDUSTRIES:

I HAVE read the article entitled "Salaries for Food Technologists" and find it extremely interesting.

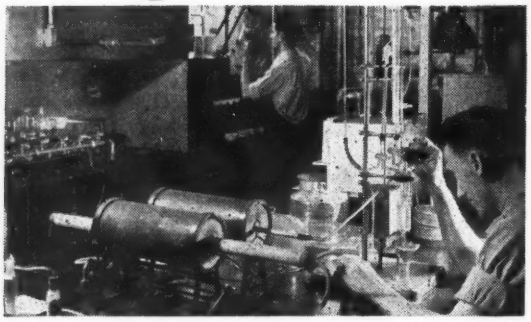
All of us who are familiar with the "Help Wanted" ads in our professional and technical journals, as well as the types of questionnaires used by personnel departments in industry, recognize the familiar types cited by the author; and we must agree with his comments on both of these. The author, however, fails to recognize the wide differences in personality among our professionally trained men in their ability to sell themselves personally as well as professionally, and perhaps fail to realize their own limitations in the way of equipment for a particular new job. After all is said and done, the technical man with complete equipment for a new job must be his own salesman, and should have the stamina and courage to decline the offer of a position if the salary is not commensurate with his potential and proven ability. I doubt very much whether the American Chemical Society, the I.F.T., or other technical organizations can do anything of a practical nature in raising the ceiling on salaries for professional men in industry. Each case is an individual situation, and both you and I can cite many illustrations of technical men, both in the food and non-food fields, who have gone a long way both professionally and financially. If we analyze any of these individual cases, we find that personality is perhaps the most important and outstanding element in all of the qualifications of that particular individual.

In my opinion, our younger and older food technologists need to apply to themselves a critical self-analysis to answer such questions as: "How do I stack up against the other fellow?" "What has he got that I haven't got?" "What basic technical equipment do I have that particularly fits me for a given new job?" "Am I sufficiently alert and progressive to keep up with current scientific and technical advances?" "Do I get along well with my associates and superior officers?" "What attributes of leadership do I have in my makeup?" "Can I present adequate and effective written or oral reports on my work?"

When these and many other questions are answered by the individual, we will be making a long step forward in establishing the true value of technical men to industry. You and I both know many, many cases of square pegs in round holes. Blame for this rests both on management and on the individual. The individual should have the moral courage to analyze critically the requirements of a new job and to calmly evaluate his own equipment for this new assignment. In my long experience in food work I have had many opportunities of recommending men for better jobs; in each case I have made it my personal business to learn all that I could about the requirements of the particular position before I recommend an individual for it. As a result of this foresight, I have had no instances of failures of such men to fulfill the new jobs and especially at a salary satisfactory to them. If our individual technologists gave more thought to their own fitness for higher jobs, the situation would be helped very greatly. As we all know, the number of top jobs is naturally limited and the old adage, "Many are called but few are chosen," is certainly pertinent.

In closing, I want to emphasize another point which has been close to my thinking for many years. That is the general problem of improving personalities in our technically trained men. I have discussed this many times with my educator friends in the hope that

From selection of Raw Materials ...to Final Assembly



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something might be done either to develop good personalities or improve them. From my personal experience in the selection of scientific men, extending over a period of many years, I rate personality as high as the technical equipment of a man.

I assume that any man or woman, with degrees from institutions of recognized standing, has the necessary professional background and training. While I recognize full well that industry, whether food or non-food, will not pay more for special services than is necessary in order to obtain the services of a satisfactory individual, I still have faith in the fairness and judgment of management in recognizing in a practical way the value of the individual to the organization.—*Food Technologist, Company A.*

Just Plain Silly

To the Editor
Of FOOD INDUSTRIES:

POOR RICHARD'S article in the October issue of FOOD INDUSTRIES was indeed interesting. I am definitely in favor of high salaries for technical men. However, Poor Richard evidently wants things handed to him on a silver platter. That there is no salary ceiling is demonstrated by the careers of many wealthy technical men. The blame for a low salary often lies as much with the individual as with management. A man who is merely a technician is no more valuable to a business than any other skilled workman. There is nothing magical in being a technical man. You've still got to produce the goods, and the man who produces the goods is usually suitably rewarded. Unfortunately, there are a few exceptions which give Poor Richard grounds for gripe. The important thing is for the individual to try to analyze his position, not in terms of what the other fellow gets but in terms of his own real contribution to the success of the enterprise.

Be that as it may, I would rather be a technical man with the inner satisfaction that comes from having produced than a stuffed shirt behind a desk, regardless of pay.

Poor Richard's comments regarding employment applications are just plain silly. Anyone with the intelligence usually associated with technical men is supposed to realize that such applications are an attempt by the personnel departments to make one form cover all types of applicants.—*An Executive, Company D.*

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

MANAGEMENT

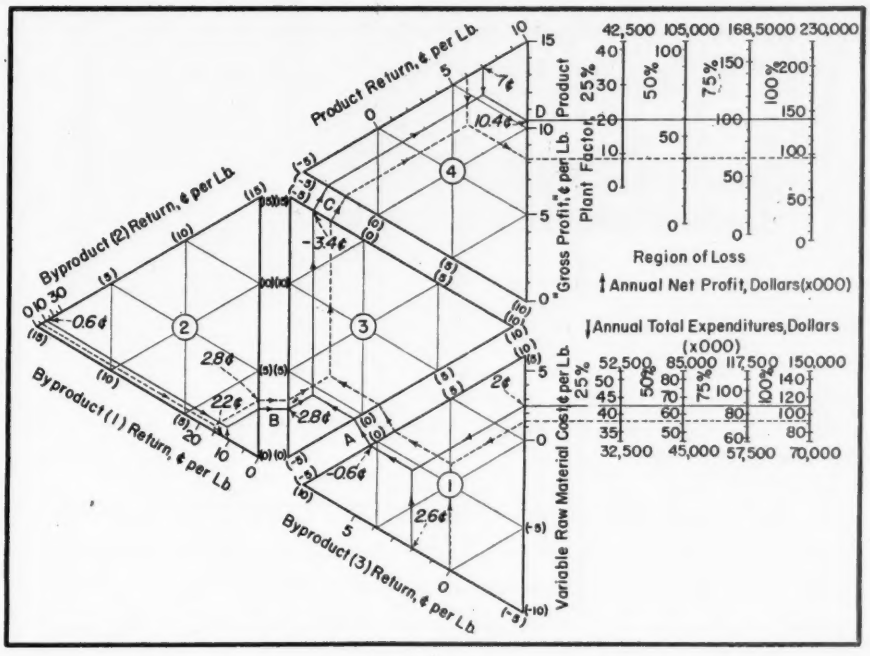
Graphical Costing

BASED on the use of equilateral triangles for the addition or subtraction of independently variable factors, a chart system for evaluation of cost situations has been evolved. An advantage is that it permits clear expression of profits to be expected, not only when the plant is in full operation but when it is operating at various percentages of the full capacity. In this way the method makes possible a concrete expression of the areas of profitable and nonprofitable operation.

The chart here reproduced as an example shows how five variables may be handled graphically by this method. These are the raw material cost, on the vertical scale of the lower triangle; the return to be realized on three different byproducts, as shown by the scales at the bottom and lower left; and the selling price of the product. Results are expressed in terms of "gross profit," which is actually the profit as influenced by the variable factors. The vertical scales at the upper right translate this into terms of net profit per year by bringing in the fixed operating expenses for operation at selected percentages of the total capacity. The scales at the lower right similarly translate the raw material cost into an expenditure which takes into account the fixed charges for operation at various percentages.

In practice the triangles would be laid out without intervening space, separated by heavy lines, to facilitate use.

(As in any system using triangular coordinates, the trick is to remember, or figure out, which lines should go parallel to which axes. The author uses a method based on whether the enclosing angles are 60 or 120 deg.) In following the chart, it is helpful to note that triangle 1 subtracts the return on one byproduct, No. 3, from the raw material cost; triangle 2 adds together the return on the other two byproducts; triangle 3 subtracts the sum found in 2 from the difference found in 1, that is, it gives a result that is the raw material cost minus the return on all three byproducts; while triangle 4 subtracts this resultant cost from the expected return on the product.



Typical chart for calculating the effect on profit of several cost-variables.

Digest from "Process Economic Analysis Aided by New Graphical Method," by M. M. Reynolds, *Chemical and Metallurgical Engineering*, vol. 52, 104-6, August, 1945.

DAIRY

Condensed Milk

SUGAR in condensed milk, if it is above the concentration held in solution, should be present only in the form of extremely fine and uniform crystals. A patented means to accomplish this, and at the same time to eliminate the use of contact coolers and high-pressure pumps, depends on producing the crystallization throughout the body of the partly condensed fluid by suddenly lowering the temperature through application of increased vacuum.

The milk, with added sugar, is evaporated in the usual vacuum pan, under a partial vacuum at a temperature of 120 to 145 deg. F., but only to the point where it contains 3 to 5 lbs. more water per 100 lbs. than is desired in the final product. The mix is then drawn into a vacuum tank that is under substantially lower pressure, preferably 12 to 16 mm. of mercury. It is allowed to cool as desired through evaporation of the excess water. For instance, if the pressure is allowed to increase to 24 to 33 mm. of mercury, absolute, the temperature should fall to 85 to 95 deg. F. As soon as the transfer is completed, an agitator in the vacuum tank is started. It is possible to agitate at high speed without incorporating air, because of the evacuated condition of the tank. Lactose or other seed crystals can be added at this point if desired.

Digest from U. S. Patent 2,381,761, issued Aug. 7, 1945, on an application dated March 16, 1942, to P. T. Lemmel and H. P. Fell, and assigned to The Borden Co., New York.

Tinned Butter Spoils

BACTERIAL flavor defects in tinned butter could be controlled by the use of salt in the range from 2.5 to 3 per cent, combined with boric acid or with the use of vacuum during working. But even then oxidative rancidity developed. Ethyl gallate inhibited oxidation but not deleterious flavor defects. These results were obtained by storage tests at temperatures of 61 to 71

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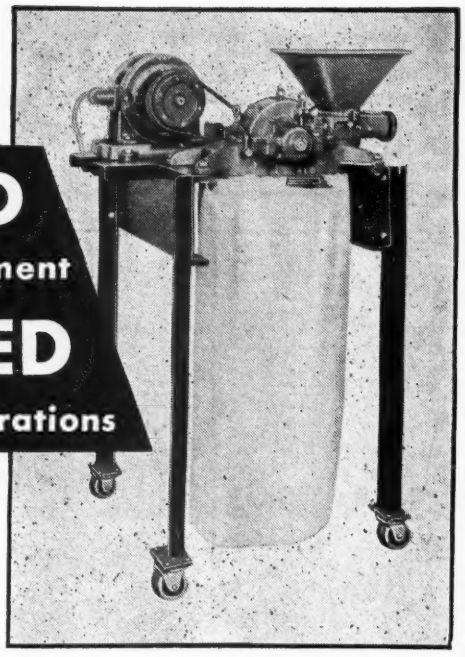

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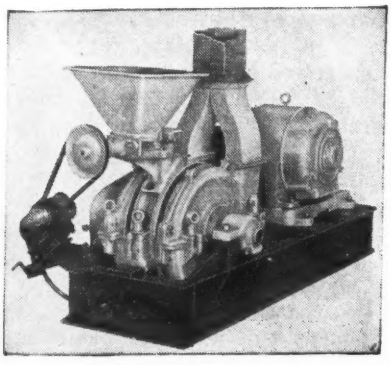

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deg. F., with a 5-day period each month at 86 deg. F., the tests continuing for a period of 3 months.

Since in any case there is an objectionable physical condition due to melting, the author concludes that the essentially perishable nature of butter can not be sufficiently modified by the methods under test —use of antioxidants, preservatives and vacuum working—to render it suitable as a tinned product for use of the armed forces in the tropics.

The results of the experiments, which preceded those that led to the high-melting-point butterfat spread, are published now because they do show conditions leading to certain defects in butter and have a bearing on the whole question of the keeping quality of butter under more normal conditions.

Digest from "The Keeping Quality of Tinned Butter," by E. G. Pont, *Journal of the Council for Scientific and Industrial Research*, vol. 18, 53-61, February, 1945.

SUGARS

Fruit-Sugar Sirups

MIXING straw or sorghum with wet fruit pulp before filtering and pressing will facilitate extraction of the sugar-bearing fruit juices from fruit pulps. Addition of lime or other alkali aids in the removal and also helps eliminate impurities.

Juice so obtained is suitable for further processing to form a sirup. The filter cake is usable as fertilizer or feed, depending on the cellulose material added. The added lime increases the value for fertilizer.

Digest from U. S. Patent 2,382,407, issued August 14, 1945, on an application dated Feb. 12, 1942, to A. M. Erickson and J. D. Ryan, and assigned to Barron-Gray Packing Co., San Jose, Calif.

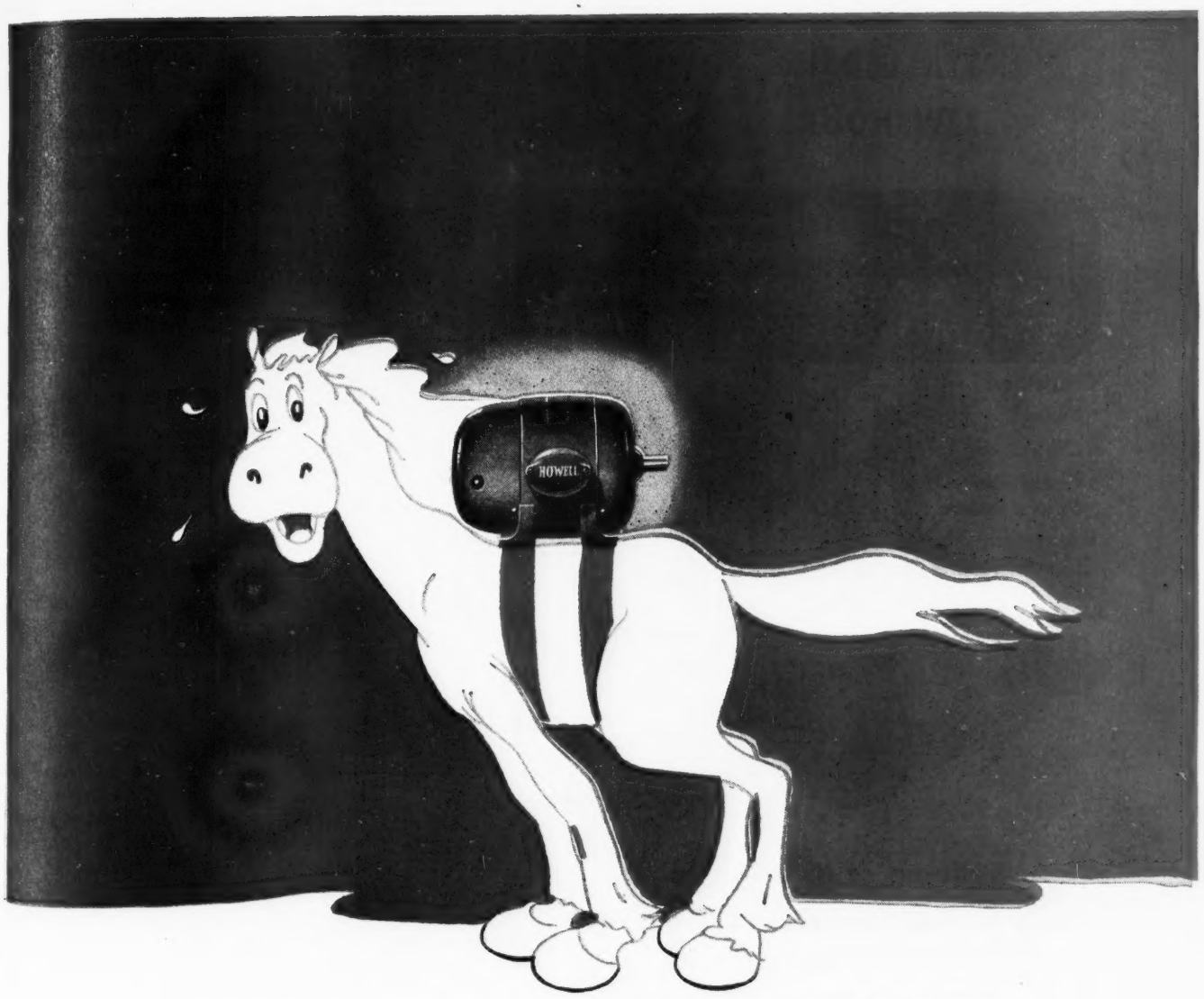
FATS AND OILS

Linseed Reversion

No laboratory or commercially prepared hydrogenated linseed oil examined in a Canadian government laboratory was considered satisfactory from the standpoint of flavor reversion.

Shortenings were stored at 110 deg. F. in the absence of light but with access of air, for periods up to 56 weeks. All were resistant to normal oxidation but resisted reversion only when hydrogenated to iodine values below 38.

Changes in refining methods did not materially influence the results. Hydrogenation at 374 deg. F. was



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The Howell Protected Type Motor, shown, gives complete protection against dripping liquids, metal chips and other falling particles. Completely streamlined—utilizing non-breakable steel frame—malleable or steel base—cast iron end plates and cast iron weatherproof terminal box are standard construction features. Special horizontal and vertical mountings are available. *Available in sizes 5 H.P. and smaller. Other sizes and types available up to 150 H.P.*

Years ago—1915 to be exact—we set out to build a line of motors to do specific jobs in industry.

These jobs were all what you would call "tough jobs." They were gruelling tasks which required the precision-building of higher-quality motors. They were jobs which demanded thorough insulation and sturdy construction.

We built our motors to meet the rigid requirements of just such jobs as these. To distinguish them from other makes, we put Red Bands on them. We constantly challenged buyers to give "Red Band" Motors their tough jobs.

They did! Performance alone brought bigger and bigger sales volume. Each year, more and more industries, like yours, learned to depend on Howell quality.

Today, modern construction of our motors does not make it practical to include the Red Bands, but their quality is the same or better than that of the motors that bore the famous Red Band.

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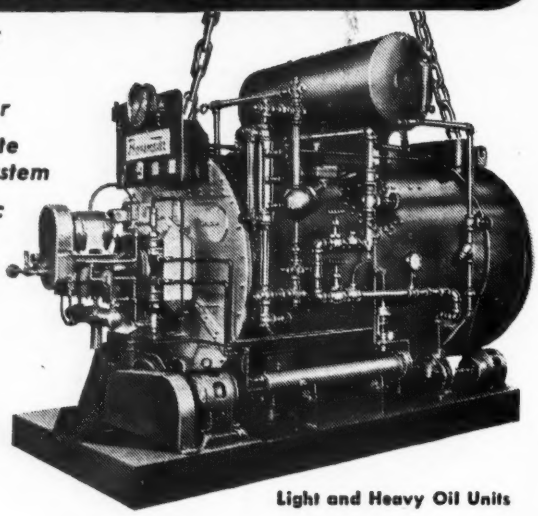

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Some of its advantages:

1. Assures high overall efficiency
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slightly better than at lower temperatures. Blends with sunflower seed oil or cottonseed oil suffered less from flavor reversion as the proportion of linseed oil decreased, but no real improvement was achieved because the blends were subject to oxidative rancidity.

The conclusion is again reached that linseed oil can be made into a suitable shortening only by some method which removes linolenic glycerides before hydrogenation, or possibly by a technic of selective hydrogenation that prevents formation of the iso-linolenic constituents.

Digest from "Flavour Reversion in Hydrogenated Linseed Oil. II. Effect of Variations in Processing Procedures," by H. W. Lemon, A. Lips and W. H. White, *Canadian Journal of Research*, vol. 23 F, 295-303, September, 1945.

High-Quality Oil

KEEPING fish livers in suitable condition for the production of high-grade oil is a serious problem wherever fishing banks are located very far off-shore.

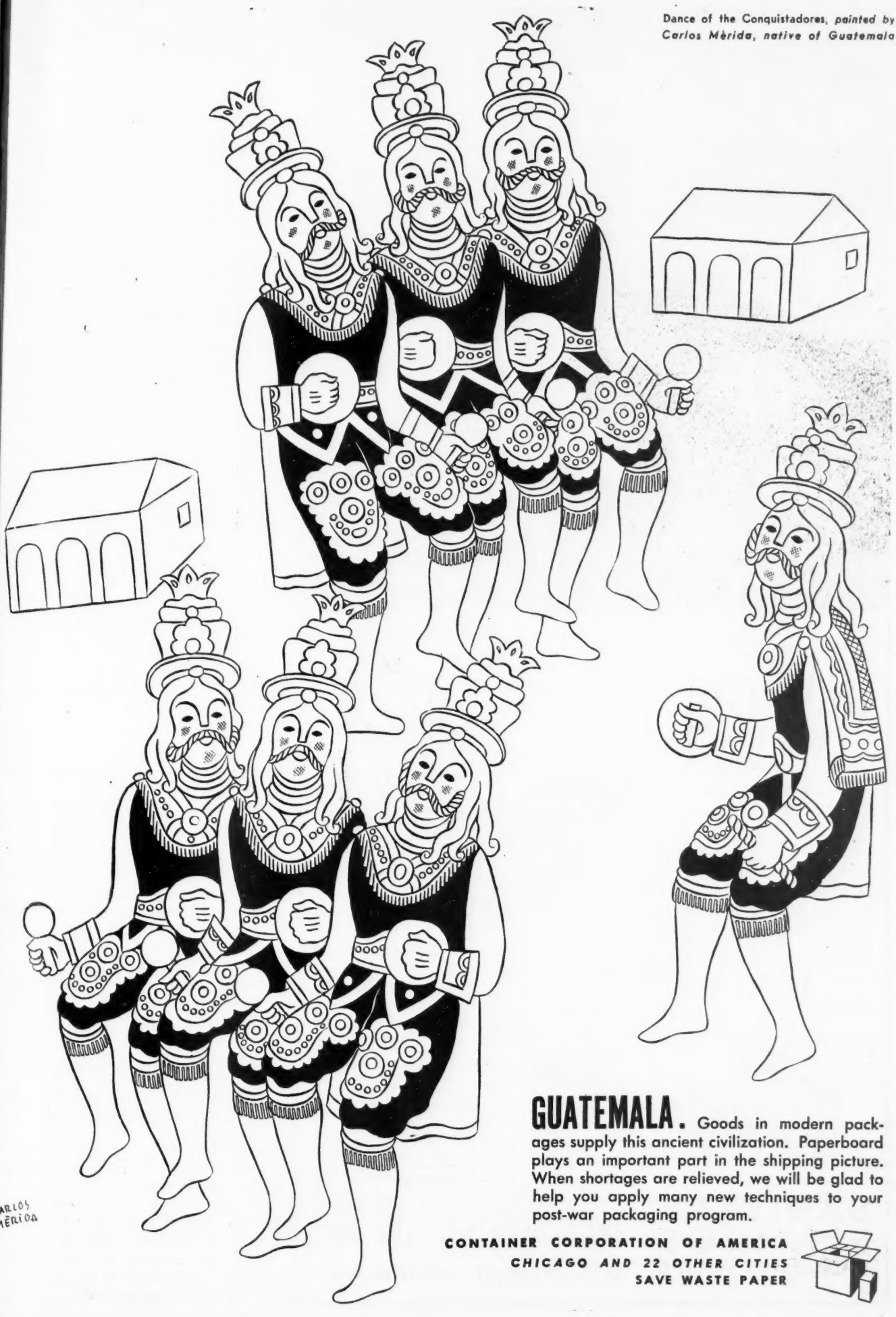
When the fish livers are not processed promptly, digestive enzymes break down both the protein tissues and the fat. The former is desirable, since it facilitates recovery of the oil, but the presence of fatty acids is detrimental to the quality of the oil.

Use of preservatives or germicides, such as formaldehyde or acetaldehyde, or of alcohol in sufficient quantity to coagulate the protein tissues, will prevent enzyme action. But the oil is enclosed within the hardened and shrunken cell walls, so that it can be recovered only by complicated processing, with relatively poor yields.

In the disclosure of a recent patent, it is stated that the use of alcohol of a less concentration than that which causes coagulation will still have a beneficial effect. In fact, within a certain range of concentrations, the lipolytic enzymes are inhibited but breakdown of the protein tissue proceeds. With an overall concentration of alcohol between 3 and 12 percent, the livers may be left in the solution until complete cellular digestion has taken place. Addition of organic acids to reduce the pH will bring about a more rapid digestion, with equally good or better inhibition of the undesirable effects.

On standing, a clear oil rises to the top and may be removed. Free fatty acids can be brought within U.S.P. requirements by neutralization and decantation.

It is asserted that bacteriological



Dance of the Conquistadores, *painted by Carlos Mèrida, native of Guatemala*

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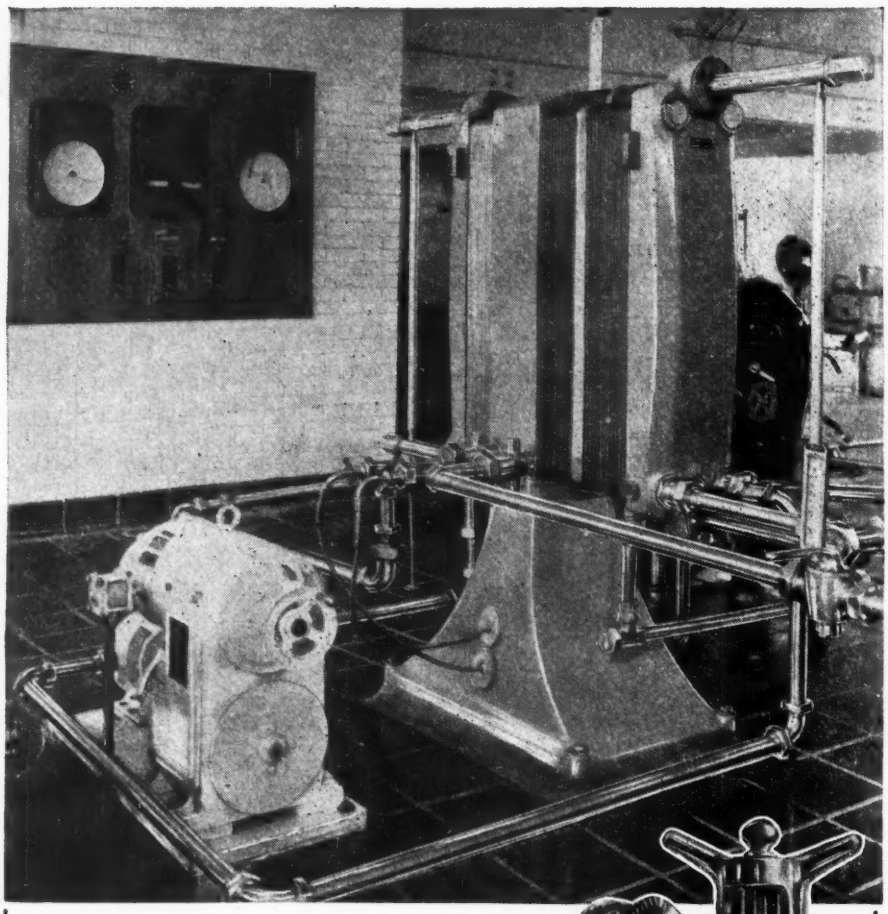

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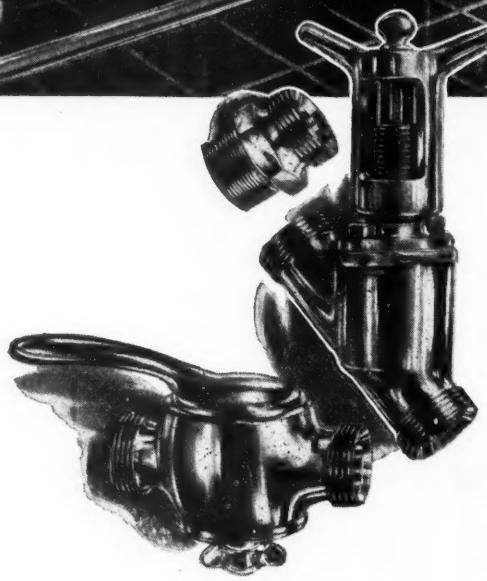

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spoilage does not take place, even at 70 deg. F. The oil, after washing with water and filtration through sodium sulphate, is sweet smelling and light yellow in color.

Ethyl or isopropyl alcohol and acetic acid are preferred as the preserving agents.

Digest from U. S. Patent 2,380,847, issued July 31, 1945, on an application dated May 26, 1942, to C. W. Kaufman and assigned to General Seafoods Corp., Boston, Mass.

FOOD CHEMISTRY

Sugars in Milk

MIXTURES of sucrose and lactose, such as occur in condensed milk, can be estimated conveniently by optical rotation. Sodium metabisulphite decreases the optical rotation of aldose sugars. Under properly chosen conditions, the relationship between optical rotation and percentage of one of the two sugars in the mixture is a straight line. It is therefore possible to read off directly the ratio of the two sugars in a solution containing the bisulphite, the total sugar having first been estimated by optical rotation of an untreated solution.

The following values are given for the optical rotation of a sucrose-lactose hydrate mixture containing 10 grams in 30 per cent bisulphite solution at 20 deg. C. with a 200-mm. tube:

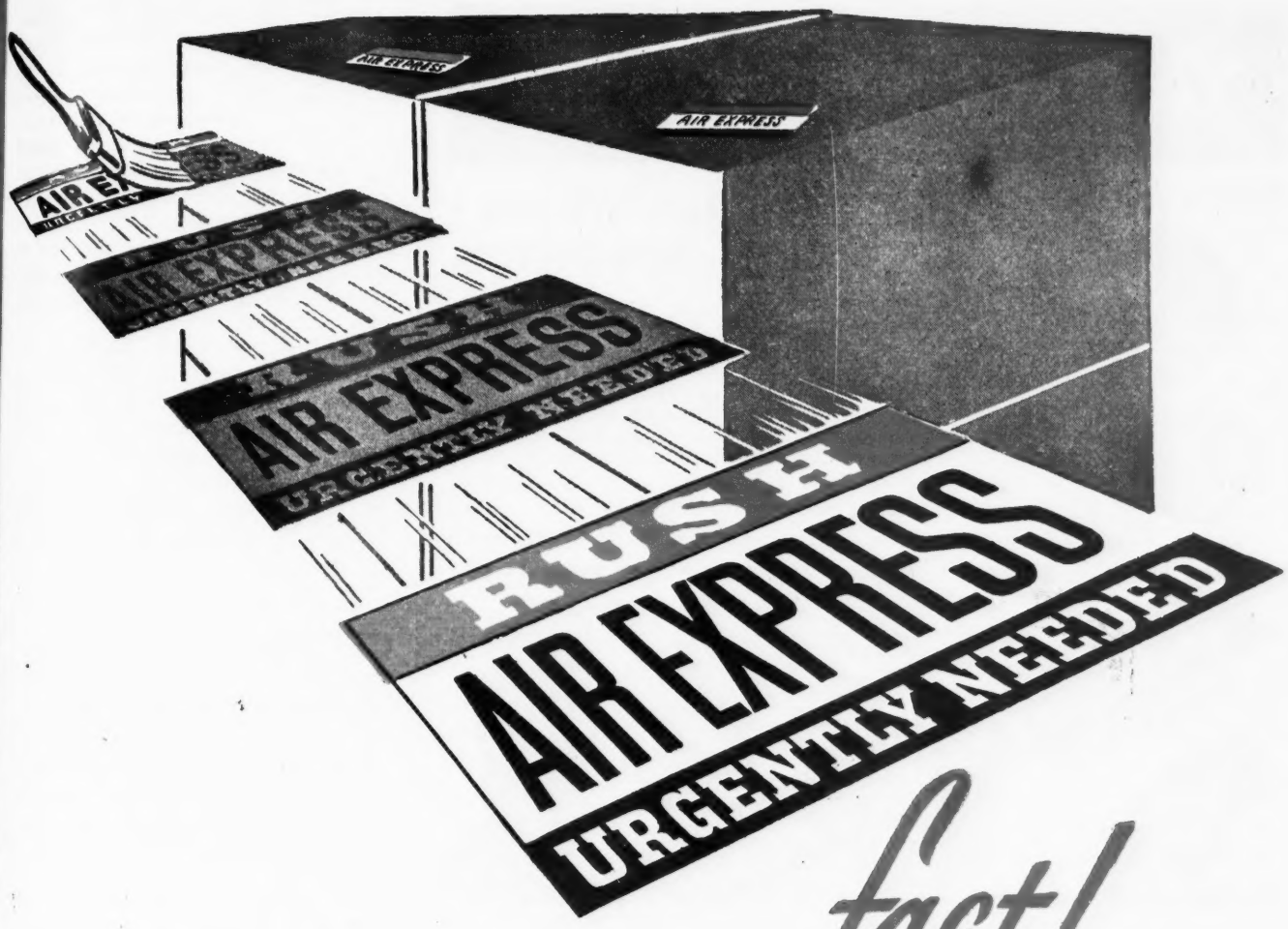
Percent sucrose	Percent lactose	Rotation, degrees on international sugar scale
0	100	8.2
20	80	13.1
40	60	18.4
50	50	21.0
60	40	23.2
80	20	28.3
100	0	33.9

It is pointed out that the last figure gives a good test for the purity of the sucrose. A commercial granulated sugar gave a rotation of 32.9.

Digest from "Estimation of Sucrose and Lactose in Binary Mixtures with Particular Application to Sweetened Condensed Milk," by H. H. Browne, *Industrial and Engineering Chemistry, Analytical Edition*, vol. 17, 623, October, 1945.

Soybean Oil Mixtures

DETAILS of the method for quantitatively determining soybean oil in admixture with cottonseed or peanut oil have recently been published. The method was announced by chemists of the Southern Regional Research Laboratory some time ago. It is based on the presence of linolenic acid in soya oil and the absence of this or any other triple-bonded compound in either of the other oils.



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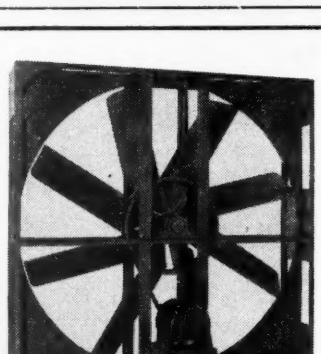

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Alkali isomerization of linolenic acid produces a triene bond which exhibits a definite absorption of ultraviolet, the maximum effect being at a wavelength of 268 millimicrons. This absorption is small but measurable for the straight acid. Use of precautions to insure an optically transparent solution permits extension of the method to the very small effect attributable to as little as 5 percent of soya oil in a binary mixture.

The recommended technic includes use of glassware highly resistant to alkalis and carrying out the isomerization under an atmosphere of purified nitrogen.

Digest from "Spectrophotometric Estimation of Soybean Oil in Admixture with Cottonseed and Peanut Oils," by R. T. O'Connor, D. C. Heinzelman and F. G. Dollear, *Oil & Soap*, vol. 22, 257-263, October, 1945.

CEREAL PRODUCTS

Milling Whole Wheat

ASCEPTICALLY clean, light-colored, whole-wheat flour with good keeping and baking qualities is said to result from a plan of wholly automatic milling on which a patent has been issued.

The grain is first mechanically cleaned by mixing an abradant material such as sawdust with it during the customary treatment to remove the bran coating. At the same time, the cellulose portion of the impervious layers is removed by rotating in a cylinder having an abrasive lining. After separation and sifting, the clean grain is transferred through an ozonizer or other sterilizer and milled in an atmosphere of inert gas such as CO_2.

It is part of the contemplated procedure that all operations up to and through the final packaging be automatic, without any possibility of hands coming in contact with the flour, such protection being thought to yield a clean and sterile product.

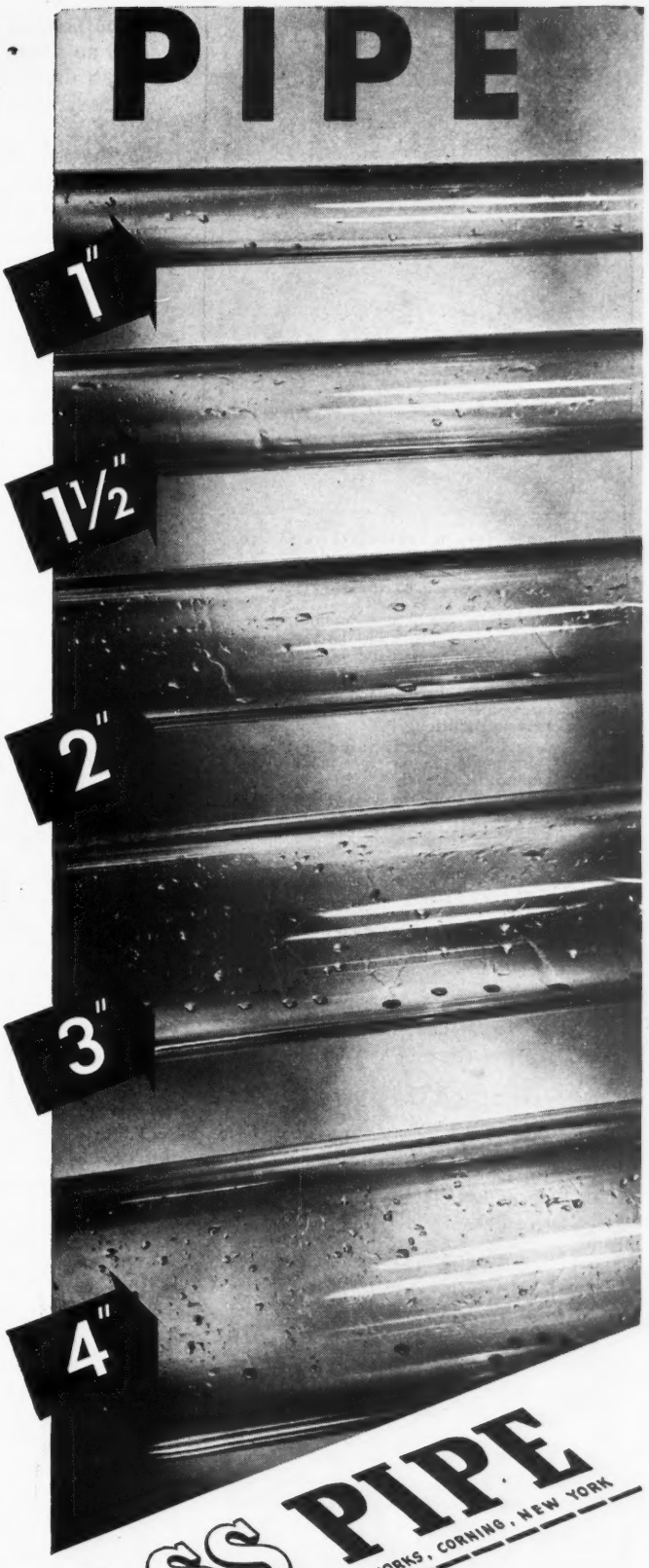
Digest from U. S. Patent 2,379,677, issued July 3, 1945, on an application dated July 15, 1942, to Voldemar Borsakovsky, and vested in the Alien Property Custodian.

Dehuller

IN the course of tests to develop a laboratory huller, particularly for sunflower seed and for oats, it was observed that in the impact-type equipment the maintenance of unbroken kernels depends on a fairly high moisture content. Hull removal is expedited by dryness. This leads to the suggestion that the

PYREX PIPE

and fittings are supplied in . . .



If your process pipe requirements can be taken care of by 4" diameter pipe or smaller, you can have all of these advantages of PYREX Pipe.

1. *Ruggedness* is proved by literally miles of PYREX Pipe that have been in actual plant service over a period of years.
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In addition, PYREX Pipe withstands high temperatures and sudden changes in temperature. Also, because of the smooth hard surface, pressure drop in PYREX Pipe is appreciably less than in pipe lines of other materials.

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DEALERS FROM COAST TO COAST

grain be held at a moisture content as high as possible for safe storage and flash dried just before hulling.

A centrifugal impact type huller is suitable for laboratory use in preparing samples for oil content and other values that must be expressed on a hull-free basis. It is simple to clean. With proper moisture in the grain and with a suitable impact velocity it will give up to 90 to 95 percent hulling with less than 10 percent broken meats. It requires no elaborate pretreatment or cleaning of the hulled grain and it will operate on unsized samples.

The huller found useful has an 8-in. diameter rotating disk and a range of speeds from 1,200 to 4,000 r.p.m. The baffle can be constructed of metal strips 1¼ in. wide or of 8x8 mesh, 16 ga. scouring screen.

Digest from "A Laboratory Huller for Sunflower Seed and Oats," by H. R. Sallans and G. D. Sinclair, *Canadian Journal of Research*, vol. 23F, 306-12, September, 1945.

FERMENTATION

Sugar Tolerance

STRAINS of *Saccharomyces cerevisiae* Hansen differ in ability to tolerate high sugar concentrations. Inhibition of alcoholic fermentation in sugar solutions is not due to the concentration of alcohol present. It may be accounted for by osmotic phenomena, since the initial concentration of glucose causing loss in fermentation efficiency corresponds reasonably well to the concentration exhibiting the beginning of plasmolysis. There may, however, be other factors involved, since variations in the optimum concentration for maximum respiration for different strains have be reported for sugar solutions well below the concentration required to produce plasmolysis.

For four strains investigated, a marked decrease in the percentage of glucose utilized occurred in the least resistant at approximately 11 g. per milliliter of glucose, and for the most resistant between 16 and 17 percent, as judged from curves presented. For the least resistant, the figures were 99.4 percent utilization at 9.544 g. per 100 ml. of initial glucose and 96.10 percent at 13.608 g., with a rapid decrease above that. For the most resistant, the corresponding data are 99.40 percent utilization at an initial concentration of 13.224 g. per 100 ml.; 98.45 percent at 18.320 g., and 79.55 percent at 22.368 g.

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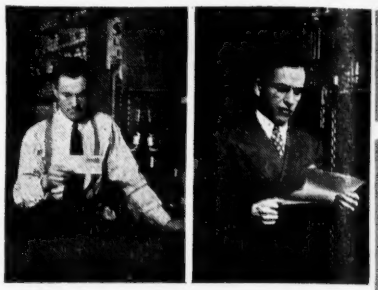

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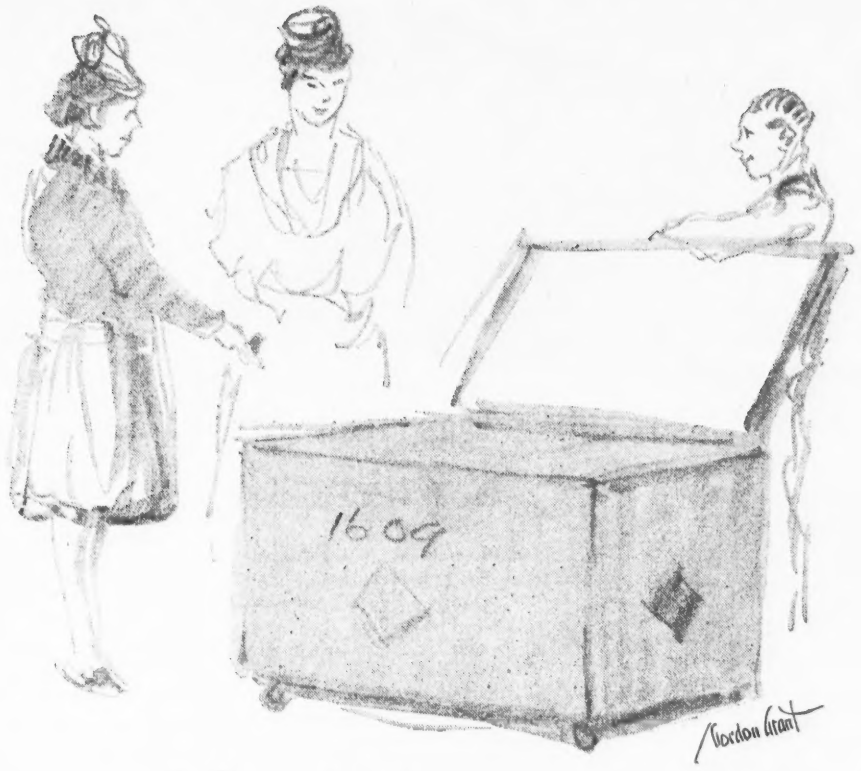

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"I'm not used to packing oyster cans — but here goes." . . .

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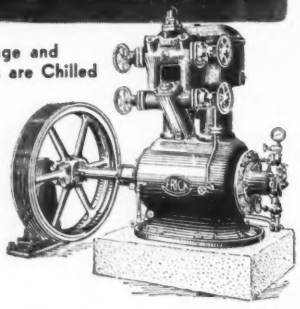

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While approximate sugar tolerance can be determined by the use of glucose solutions under the microscope, the difficulty of observing the onset of plasmolysis makes fermentation studies advisable for accurate evaluation of the sugar tolerance of yeast strains.

Digest from "The Sugar Tolerance of Four Strains of Distillers' Yeast," by W. D. Gray, *Journal of Bacteriology*, vol. 49, 445-52, May, 1945.

Starter Cultures

THERE is justification in the practice of transferring cheese starter cultures at 24-hour intervals.

Cheese made with starter transferred daily was clearly superior to that made with starter transferred only every third day. Experimental Cheddar cheeses were made under identical conditions in a University cheese plant using 300-lb. of milk per batch.

There was no perceptible difference in the flavor of the starters kept under ideal conditions when transferred daily or every third day. But the latter produced acid more slowly in the cheese-making process, and the resultant cheeses were in many cases scored as having an unclean flavor.

Incubation of the cheese milk at 86 deg. F. for 2 hours increased the production of acid at the cooking temperature (100 deg. F.).

Digest from "Influence of the Frequency of Transfer of Lactic Starters Upon Rate of Acid Development and Quality of Cheddar Cheese," by A. C. Dahlberg and F. Ferris, *Journal of Dairy Science*, vol. 28, 771-78, October, 1945.

BACTERIOLOGY

Thermophiles

OBSERVATIONS on the behavior of thermophiles grown in aerated media lead to the conclusion that development of thermophilic strains results only from a gradual adaptation to higher temperatures, so that the sudden appearance of thermophiles is not possible.

The rapid reproduction characteristic of thermophiles at their temperature of optimum growth may be of advantage in cases where it is desired to produce enzymes. Thus, with thermophilic *Bacillus diastaticus*, in a well-aerated medium, accumulation of amylase may be made to reach its maximum in 4 to 5 hours. Without thorough aeration, the rate of production may be limited by the available oxygen.

Digest from "The Growth of Aerobic Thermophilic Bacteria," by A. Imsenecki and L. Solnzeva, *Journal of Bacteriology*, vol. 49, 539-46, June, 1945.

FORMULAS FOR FOODS

FORMULA NO. 567

Butterscotch Cookies

Brown sugar	7 lb.
Emulsifying shortening	4 lb.
Salt	2 oz.
Soda	1 oz.
Eggs	1 lb. 13 oz.
Vanilla	1 oz.
Lemon flavor	to taste
Milk	3 lb.
Cake flour	8 lb.
Macaroon coconut	1 lb. 8 oz.

Directions

Cream together the brown sugar, shortening, salt and soda. Add the eggs and flavorings, continuing to cream. Soften the coconut in milk and mix this in. Mix in the cake flour by hand.

Bag out on lightly greased pans. Bake at about 380 deg. F.

Formula from Research Bakery Division, Swift & Co.

FORMULA NO. 568

Raisin Boiled Icing

Brown sugar	2 lb. 8 oz.
Water	1 lb.
Egg whites	1 lb.
Raisins	1 lb.

Directions

Boil the sugar and water together until the temperature reaches 238 deg. F. Whip the egg whites to a soft peak on medium or high speed. Add the boiled sirup slowly and beat to the desired consistency.

The raisins are to be ground wet. Fold these into the finished icing.

Formula from Armour and Co., Research Bakery.

FORMULA NO. 569

Caramel Cream Cake

Granulated sugar	3 lb. 8 oz.
Brown sugar	2 lb. 4 oz.
High-grade cake flour	5 lb.
Cream, 30 percent	1 lb.
Liquid milk	3 lb. 12 oz.
Whole eggs	2 lb. 14 oz.
Egg whites	8 oz.
All-purpose shortening	2 lb. 2 oz.
Vanilla	1½ oz.
Baking powder	4¾ oz.
Salt	1½ oz.

Directions

Melt 1 lb. 8 oz. of granulated sugar in a copper kettle over a slow fire, stirring constantly, and cook to a dark caramel color. The color of the finished cake is controlled by the darkness at this point. Add the cream slowly while stirring with a wire whip. Bring back to a boil and then remove from stove. Addition of the cream must be made carefully.

Mix the milk, eggs and vanilla, then add the hot caramel cream sirup, stirring well. The eggs and whites should be at 70 to 75 deg. F., while the milk must be cold.

Sift together the flour, 2 lb. of white sugar, the baking powder and the salt. Sift the brown sugar separately, then add to this mixture. Add the shortening at 70 to 75 deg. F. Mix for 3 minutes on low speed. slowly add 1 quart of the liquid, mix 4 minutes on low speed. Scrape down the bowl, add another quart of liquid and again mix for 4 minutes. Repeat with the remainder of the liquid, mixing for a final 4 minutes, still on low speed. The finished batter should be at a temperature of 70 to 75 deg. F.

This can be baked in 7- or 8-in. deep round layer pans, or in 2-in. deep square pans, scaling 1¼ lb. to an 8 by 8 in. square. Bake at 375 to 380 deg. F. for 20 to 25 minutes. Remove from the pans while warm. Use a caramel icing.

Formula from Lever Brothers Co.

FORMULA NO. 570

Yam Cakes

Boiled peeled yams	12 oz.
Brown sugar	8 oz.
Lard	8 oz.
Milk	1 lb.
Yeast	2 oz.
Nutmeg	⅛ oz.
Bread flour	3 lb.
Cake flour	1 lb.
Eggs	12 oz.
Salt	½ oz.

Directions

Partly mash the cooled boiled yams in the cake machine, then add the brown sugar and mix on first speed. Mix in the lard and milk. Add the yeast in 2 oz. of water, the nutmeg and 2 lb. of bread flour, and finally the eggs. Mix until smooth. In the second stage, add the remaining 1 lb. of bread flour and the cake flour with the salt which has been dissolved in 2 oz. of water. Mix to a good ball.

First fermentation at 80 deg. F. for 1 hour, second for ½ hour. Divide. Allow bench rest of ½ hour, then roll about ½ in. thick and cut with a cookie cutter. At half-proof make a depression ½ in. in diameter and ¾ in. deep. Place in each a ¾-in. cube of cooked yam. Cream together equal volumes of brown sugar and butter, and add a small amount of this to each yam cube. Before baking, brush with egg or milk.

Alternatively, instead of rolling and cutting the dough, it can be rounded into balls, proofed, flattened and proofed again. However, the first method gives a more attractive product, and since this is in any case a specialty item, the extra care in forming is more than justified.

Bake at 375 deg. F.

There will be little pieces of yam throughout the cakes that show up almost like candied fruit.

Formula from Laura K. Track.

FORMULA NO. 571

Peanut Butter Muffins

Pastry flour	4 lb.
Sugar	8 oz.
Salt	1 oz.
Baking powder	4 oz.
Peanut butter	2 lb.
Milk	6 lb.
Eggs	1 lb. 8 oz.

Directions

Blend the eggs into the peanut butter. Add the milk gradually, then mix this in with the flour, salt, sugar and baking powder, sifted together. Mix lightly, do not beat. Bake 12 minutes at 375 deg. F.

Chopped peanuts, 2 lb., or 1 lb. of soya grits can be added before baking. If it is desired to substitute molasses or honey for the sugar, use 1 lb., and add ½ oz. soda.

Formula from Laura K. Track.

FORMULA NO. 572

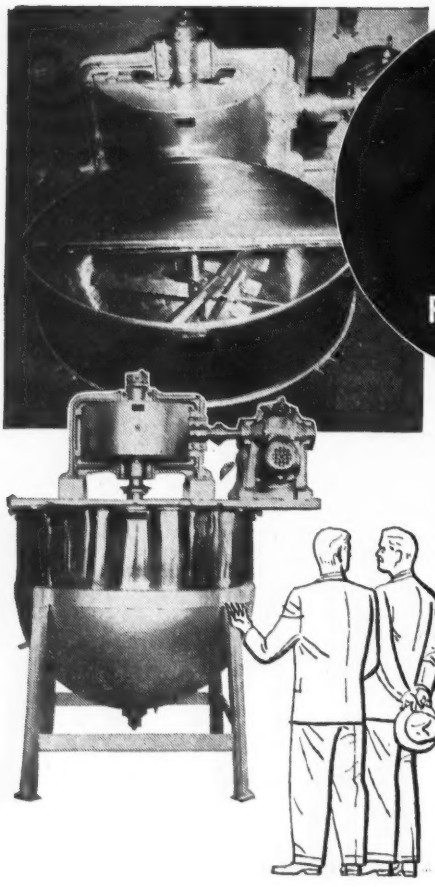
Streussel

Brown sugar	7 lb.
Potato flour	1 lb.
Shortening	7 lb.
Salt	2½ oz.
Cake flour	11 lb.
Yellow corn meal	2 lb.
Vanilla	To taste

Directions

Cream together the sugar, shortening, potato flour, salt and flavoring, for 5 minutes. Mix with the cake flour and corn meal. Use as a topping on sweet raised breads.

Formula from Roger Bros. Seed Co.



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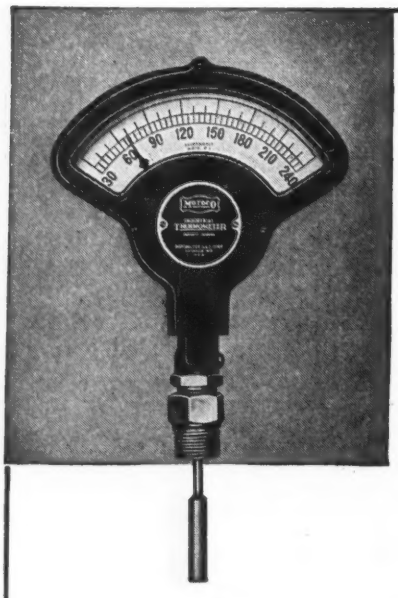

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Ways to Save Water

(*Continued from page* 116)

good use without additional expense.

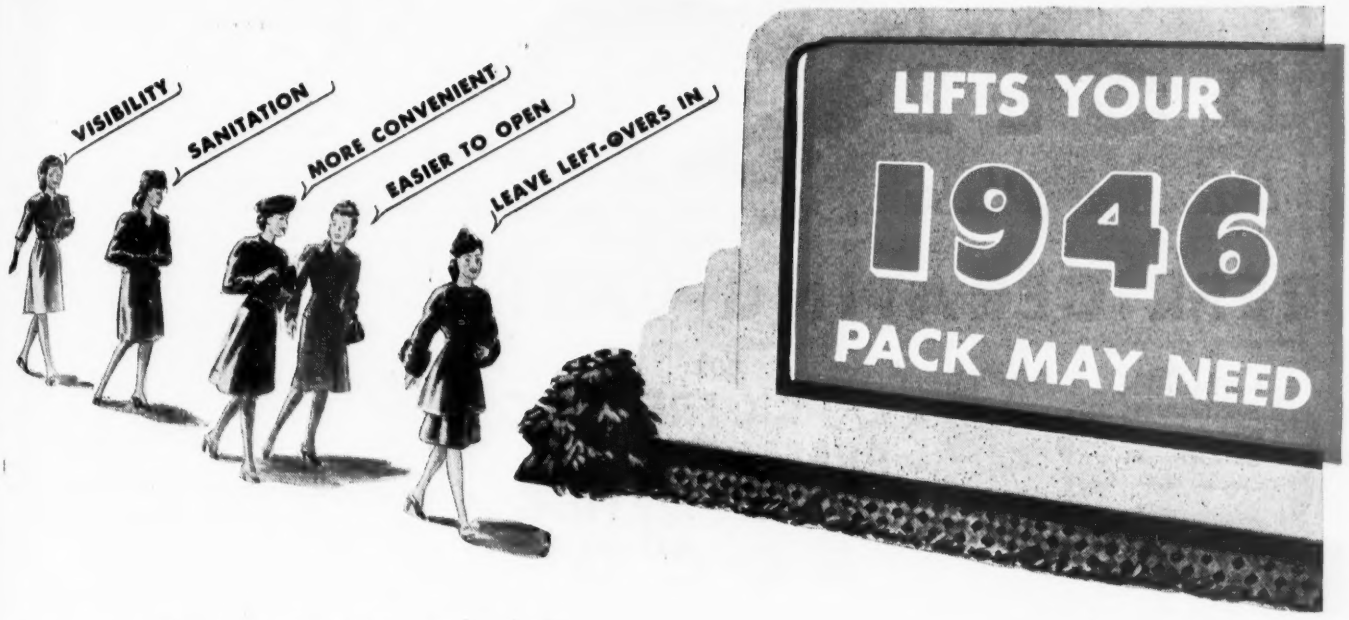
Miscellaneous Uses

Bottling plants are heavy water consumers. Here, aside from the ingredient water in the product, the principal item is rinse water. Almost invariably this is run to waste. The first rinses are dirty and contain appreciable amounts of alkali picked up in the soaking tanks, especially with washers in which the final fresh-water tank is not properly maintained in regard to water change. But washers which are not run critically often show spent final rinses to be good, clean water, with pH and alkalinity not different from, or only slightly above, those of the incoming supply. The difficulty in saving this water arises mainly from the need for storage containers. Where tanks are available, a good deal of the rinse water can be saved, and such water is excellent for general utility purposes.

Although washers are generally equipped with automatic shut-off valves which stop the water when the sprays are not in use, the writer has inspected machines in which spray-water wastage ran from 25 to 50 percent of the total water consumed, just because of nonoperation or improper operation of the automatic device. Mainly, the condition was due to water hammer. Such cases require investigation but, in general, they can be corrected.

Another item, particularly in brewery bottling plants, is the spent water from pasteurization after cooling. With spray-type pasteurizers, the spent cooling water is generally clean enough for re-use and usually not difficult to save.

Barometric and jet condensers on vacuum pan or evaporator service, which consume considerable quantities of water, are often operated with a nonpotable supply. Where a pure water supply is used, the warm discharge is generally recovered. In sugar refining, this discharge is returned for process use. In evaporated milk manufacture, on the other hand, the milk entrained in the condenser discharge makes the water unsuitable for reuse and it is best run to waste—as in all cases where the water carries putrescible material. However, in candy cooking, if entrained sugar and corn sirup are not allowed to



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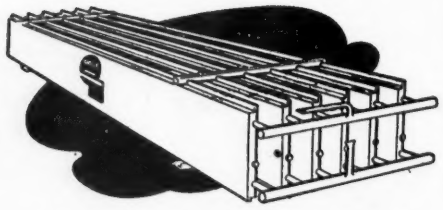

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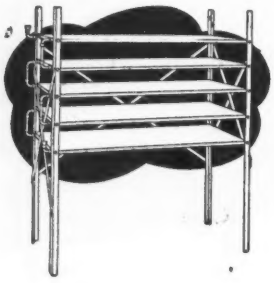

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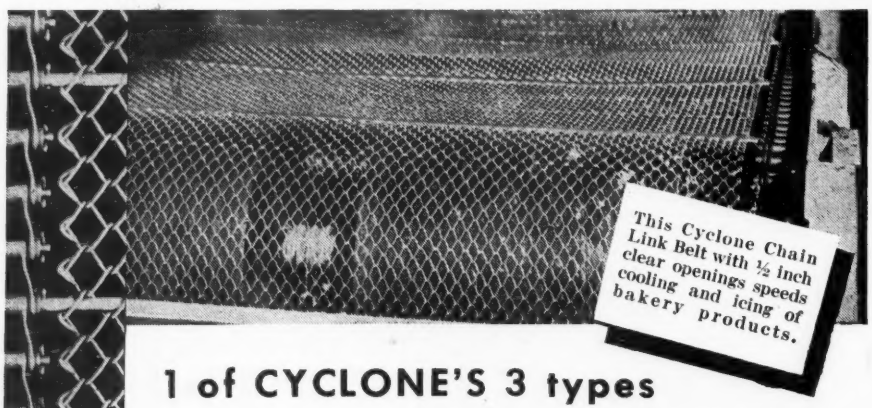

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concentrate, the condensing water may be successfully recirculated.

When not using a potable water supply in barometric and jet condensers for evaporation and vacuum cooking of foods, it is important to provide means for preventing backflow of condensing water into the pan. This is a sanitary precaution.

Personal Use

An important item that is often a source of water waste is employes' personal and sanitary use. The per capita consumption for food manufacturing is somewhat above the general average for industry as a whole. In common with all industries, it is made up both of necessary use and loss through wastefulness. Washing and drinking are necessary, but turning a faucet to full flow when a small flow will do, or letting the water run after one is through using it, is needless waste.

Habits of indifference and carelessness are costly not alone in water, but in power, materials and equipment as well. Educational programs—such as the safety campaigns carried on by the National Safety Council and by some individual employers—are paying dividends. An interesting byproduct, observed in a number of establishments, is their conservational effect. The individual who becomes careful-minded in regard to life and limb usually becomes careful-minded in regard to water and power.

For personal washing, a water-saving device which is replacing the common wash sink is the group washfountain. Types employing individual, automatic shut-off valves are particularly economical of water.

Water for drinking is another item to consider. It is often kept running so that it may be cool, a practice whose basis is more often psychological than factual. Since it takes less than one minute to replace the water in 100 ft. of 1½-in. pipe under average pressure, and the temperature of the water will never get any lower than that in the source of supply, it is needless to let the water run for more than a few minutes in buildings of average size.

The installation of self-closing faucets is sometimes a corrective, but it is not unusual during warm weather to see faucets blocked open to keep the water running for drinking.

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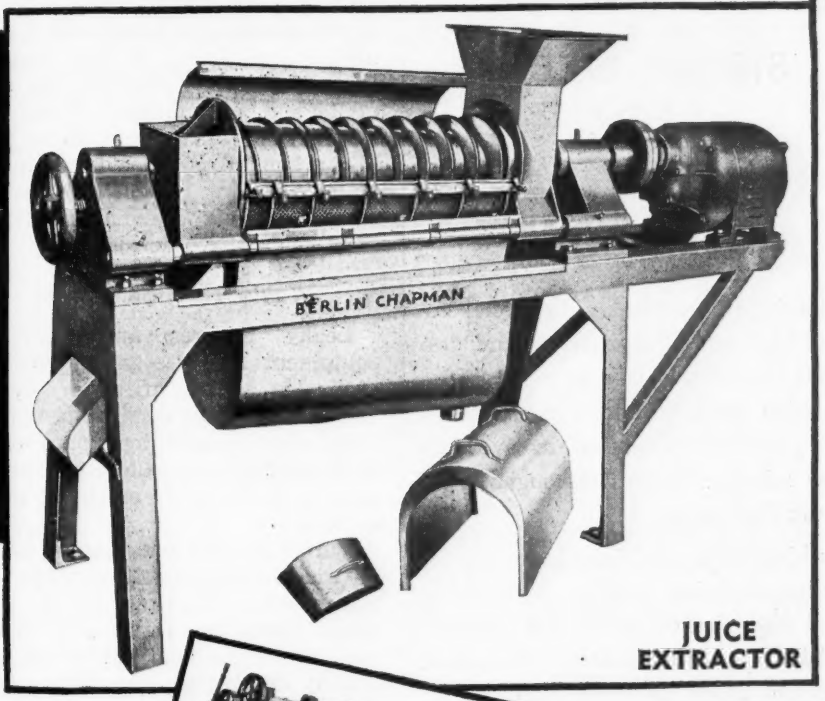

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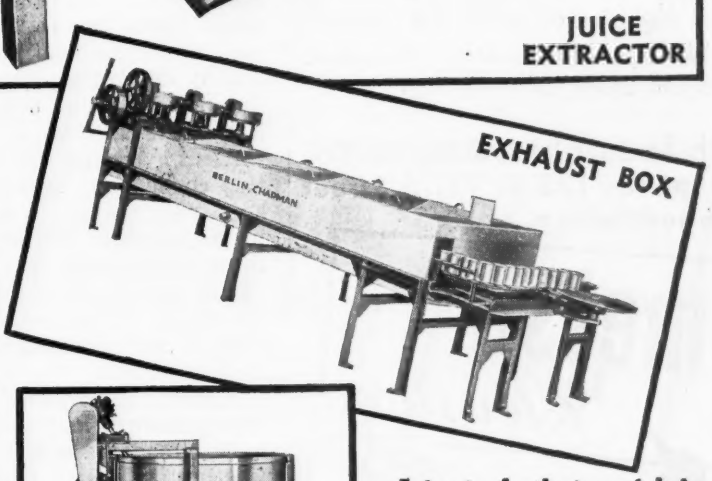

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is to install self-contained water coolers. These are desirable not only from the psychological standpoint, but offer a great economy advantage.

A closely related form of waste is the use of water for cooling luncheon foods, especially milk. Many a protest of a high water bill, particularly in commercial establishments, has been traced to this practice. Typical was the case of an employe who made a habit of cooling a half bottle of soda from 12:30 to 3:00 p.m. daily, under running water which, at the time of inspection, was flowing at the rate of 2.5 gal. per minute. Where refrigeration is available, some provision should be made for employe use. Water waste of this nature can be largely eliminated with a little cooperative action.

Waste Through Valves

Leaky fixtures and defective equipment are a common and inexcusable source of water waste. Whereas employe wastefulness may exist during working hours only, leaks usually continue 24 hours a day, a fact which often is overlooked.

Valves are the outstanding cause of waste resulting from defective equipment. Wasting steam and water valves are fairly easy to detect. Defective float valves are less readily discovered, since their condition usually is not as obvious. But quite a few defective float valves on cooling towers, evaporative condensers, makeup and storage tanks, where the water ran inconspicuously to waste through the overflow pipe, have been picked up on routine leak and waste inspections. Worn seats, stuck-open orifices and damaged floats are the usual troubles.

Automatic water regulators on refrigerating units are predominant offenders in the category of wasting valves.[2] Countless complaints of high bills have been traced to automatic regulators which did not shut off when the compressor stopped or which were bypassed for hand control. Although the bypass is necessary, it should be used only in an emergency, pending repair or replacement of the automatic valve.

Manual bypasses seldom are regulated for the actual demand but generally are fully or almost fully open. Also, the by-pass flow on automatically operating machines continues during off-cycles. This is especially wasteful in winter when refrigeration demand is low and

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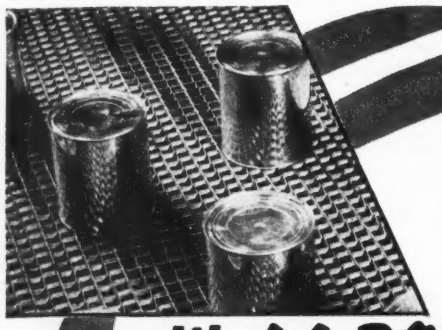

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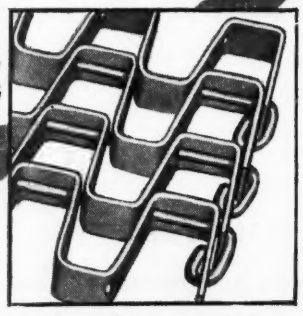

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when off-cycles are longer during week-ends and overnight. The writer has found bypasses in operation for as long as three months at a time, and in one case five and a half months. When the excuse is lack of repair parts, the operating engineer would do well to give the purchasing department a picture of water costs.

It is not good policy to wait for employe reports of leaks. A periodic checkup of the entire premises, say once a month, will eliminate waste due to leaky fixtures and equipment. This is the responsibility of the maintenance department or the plant engineer.

Winter Protection

Another cause of seasonal high water bills is the wastage of water for freeze-up prevention. Freeze-up bursts are costly, both in water and in water damage. But unless other methods are not feasible, prevention by allowing water to run should be avoided.

Insulation should be used wherever practicable. However, backflow preventers (vacuum breakers) in water supply lines *must not* be covered. The same applies to pressure relief valves. The backflow preventer is a sanitary safeguard, and the protective ability of this device depends on the unobstructed and ready admittance of air when a partial vacuum develops in the supply piping.

Piping buried in the ground below the frost line is presumably safe from freezing, although there have been numerous instances of pipes bursting underground and in the floors of unheated buildings, usually because of insufficient cover at one point or another. Underground leaks have also resulted from pipe settlement and from corrosion. The laying of outside underground pipe within a full-length sleeve or casing reaching back to the building has certain advantages, for instance, the possibility of corrosion is lessened and the sleeve acts as a tell-tale in case of a leak. Also, for short, straight runs, a sleeve facilitates repairs.

For winter shutdown of seasonal plants the best procedure is to drain all piping and water-connected equipment. Pressure tanks, booster pump and other closed water systems may have to be vented in order to get proper drainage. Condensers, tanks and other equipment with bottom inlet and top outlet should be provided with drain valves, otherwise the piping may have to be disconnected or the water pumped out. In exposed or non-

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frostproof locations, water meters and connections should be wrapped in hair felt or boxed in and covered with dry sawdust, mineral wool or other suitable insulating material. Well pits in such locations should be covered with clean, dry material.

—End—

Now—Quick Dehydration

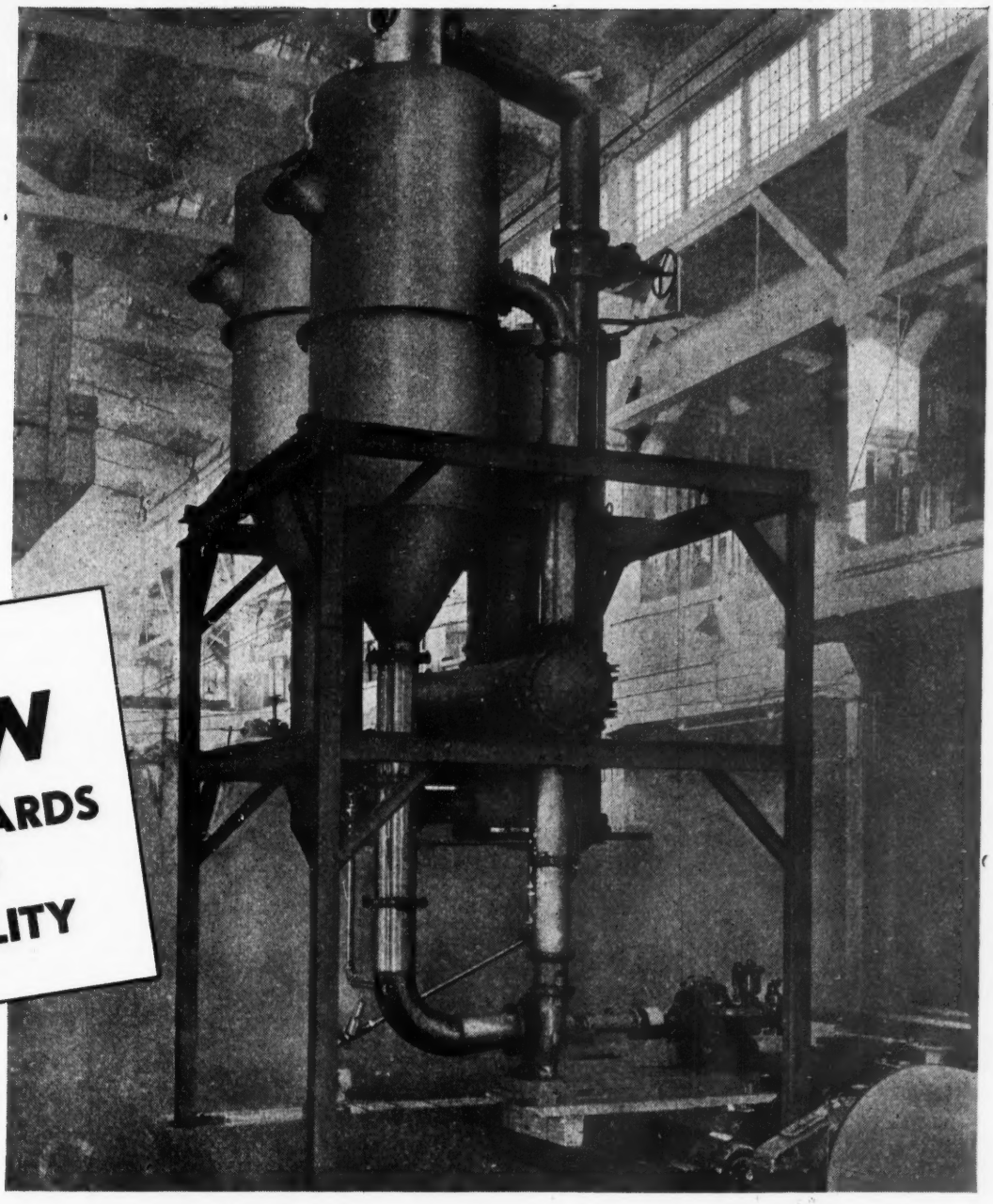
(*Continued from page 82*)

chemical neutralization unnecessary. The peeling loss is 10 to 15 percent, depending upon the size and quality of carrots used.

From the rotary washer, the peeled carrots are discharged into a water hopper, from which they are elevated to a trimming and inspection table consisting of stainless steel fixed surfaces and a five-lane continuous return conveyor of rubber-coated cannery belting. The water hopper and elevator are used only when a straight-line production flow is not feasible. Trimming losses vary from 6 to 10 percent, depending upon quality of carrots used. When available floor space permits a straight-line production flow of materials in process, the trimmed and inspected carrots are delivered directly, instead of by a water hopper and elevator, to a standard slicer and dicer to be cut into slices of ⅛-in. thickness and discharged onto a continuous stainless wire mesh belt to be conveyed through a hot-water spray (210-212 deg. F.) preparatory to being sprayed with SO_2 solution. The solution is made by passing SO_2 gas through a mixing valve with tap water. The SO_2 content is varied to obtain the desired results.

After the SO_2 treatment, the carrots move continuously through an atmospheric pressure blancher where they are subjected for 4 minutes to steam delivered from a header carrying a pressure controlled between 5 to 12 lb. per square inch. As the sliced carrots are discharged from the blancher, they are fed continuously into the top of the dehydrater by a slat-belt conveyor elevator.

When the carrot slices—containing approximately 88 percent water, are delivered into the dehydrater—their temperature is approximately 200 deg. F. In the first drying zone, they are subjected to an average air temperature of 450 deg. F. (identified as "convected heat"), to radiated heat from the overhead heaters, and to conducted heat from the flat plates under the



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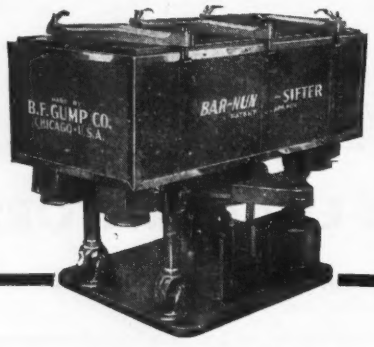

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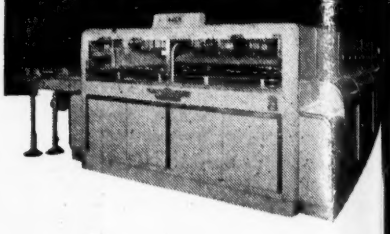
wire-cloth belt. During the 6-minute belt-travel through this zone, they lose approximately 40 percent of their original moisture content. One effect of this rapid rate of evaporation is the cooling of the carrot slices to approximately 120 deg. F. At this temperature they are delivered by gravity to belt 2, or the second drying zone. The moisture-laden air, heated to approximately 500 deg. F. by the time it reaches the delivery end of this zone, is drawn off at top of dehydrater and caused to flow over the incoming blanched carrot slices and to become saturated by removal of excess surface water from the carrot slices. It is then vented into the atmosphere.

During the 8-minute belt travel through the second drying zone, the slices lose another 30 percent of their original moisture content under the drying action of an average convected air temperature of 350 deg. F., supplemented by radiated heat from overhead heaters and conducted heat from grids under belt 2. As the slices with 70 percent of their original moisture content removed are dropped to belt 3, or the third drying zone, the convected air, heated to 400 deg. F. in the second zone, is picked up by the fan at the end of belt 1 and blown into the first drying zone.

During the 10-minute belt travel through the third drying zone (at an average air temperature of about 290 deg. F.), the 15-minute belt travel in the fourth drying zone (at an average air temperature of about 260 deg. F.) and the 20-minute belt travel in the fifth zone (at an average air temperature of about 220 deg. F.), the slices lose a total of about 28.5 percent of their original moisture content—15, 10 and 3.5 percent, respectively—to make a total of 98.5 percent for the five zones. In each of these three zones, the slices were subjected to convected, radiated and conducted heat as they were in the first and second drying zones. Also the convected air was heated to 300, 275 and 250 deg. F., respectively, before being delivered by fan action to the preceding drying zone.

This rise in air temperature progressively increases the moisture holding capacity of the air, and in that way increases the evaporation rate of moisture from the carrot slices over and through which it is blown. In this manner, the approximately 98.5 percent of the original moisture content of the slices is removed during the product travel-time through the

Automatic COOLERS



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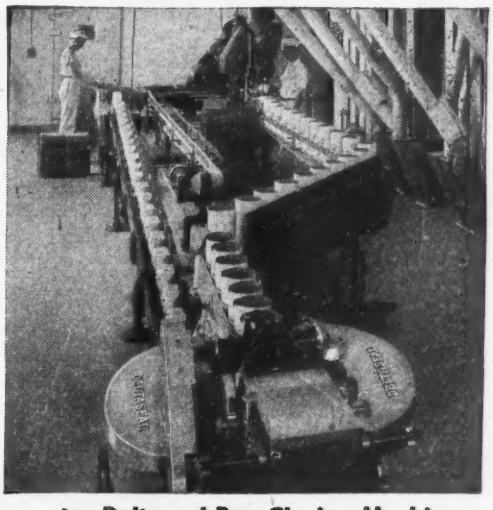

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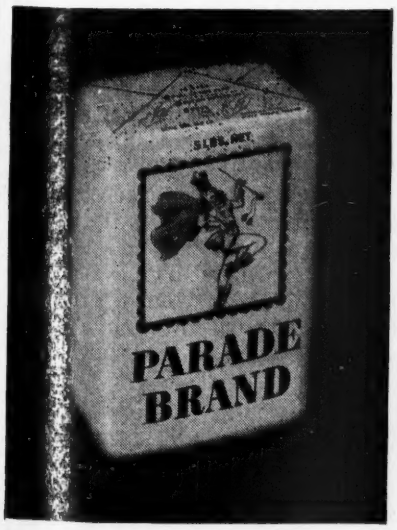

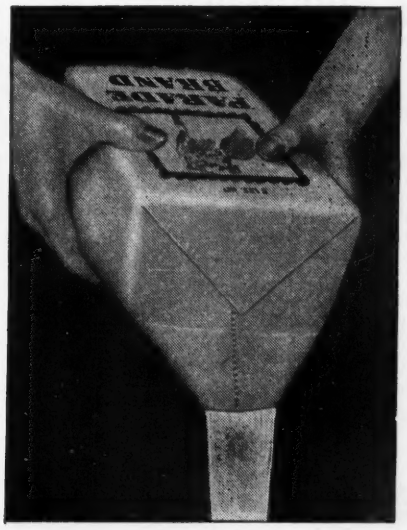

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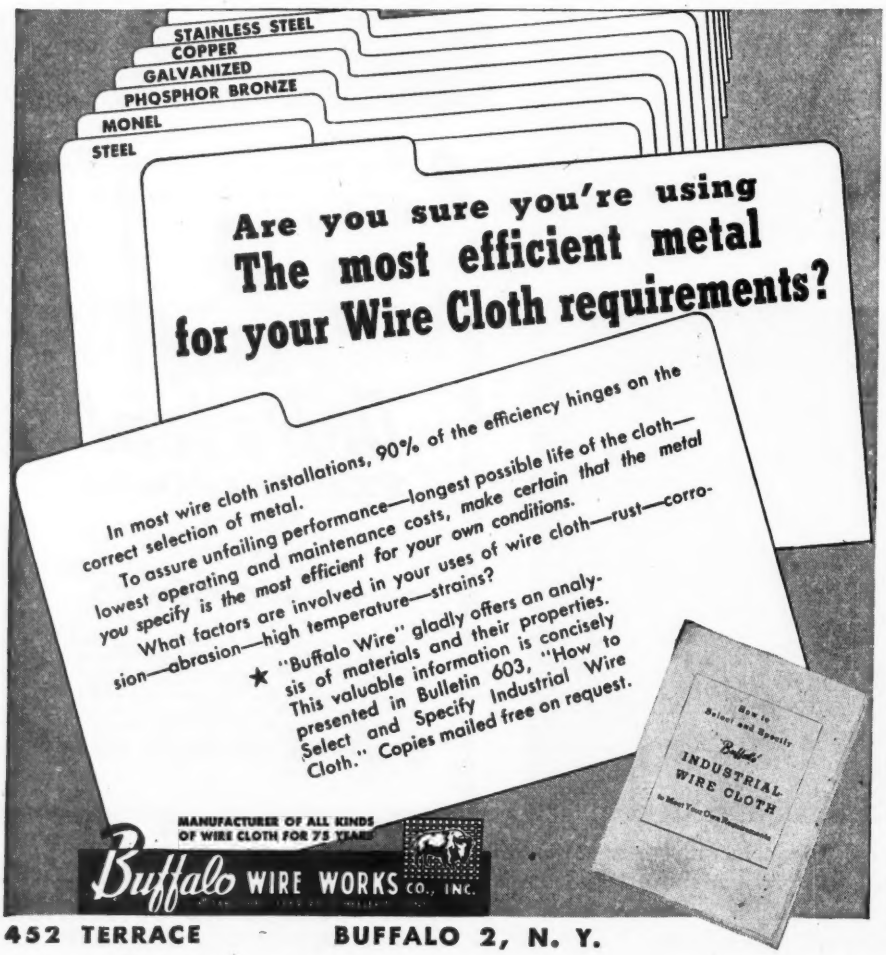
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five drying zones without any case-hardening or darkening in color. Because of the tedder action and the winnowing effect of the convected air, the travel-time of the carrot slices through the five zones is only about 20 minutes. The total belt-travel time is approximately 60 minutes.

When the carrot slices are delivered to belt 6, or the finishing zone, they contain only about 1.5 percent of their original moisture content, or a residual moisture content of approximately 10 percent. They are more susceptible to heat damage than they were in the previous drying zones and are so light in weight that they could easily be carried through the sixth drying zone with very short travel time if the air flow were not checked by the baffles previously referred to. For these reasons, the finishing treatment is made in the four stages as previously described.

3 to 4 Percent Moisture

Results of storage studies have shown a definite relationship between the moisture content and the shelf life of packaged dehydrated foods— of vegetables particularly. Since that relationship is reported to be in the magnitude of doubling the shelf life by decreasing the residual moisture content 1 percent, the objective of quick dehydrated foods is a final product containing less than 5 percent residual moisture. Removal of the last 1 to 2 percent of original moisture to attain a 5 percent or less residual moisture content with minimum decrease in color, flavor and nutritive values is a time-consuming and painstaking operation. By subjecting the carrot slices to the sweating and the alternate vigorous and gentle heated-air treatments during a travel time of approximately 60 minutes, through this finishing zone, a finished product containing from 3 to 4 percent moisture is obtained.

For the drying of carrot slices, the air temperature in the finishing zone is held between 170 and 175 deg. F. This drying temperature is obtained wholly from filtered air drawn through a steam blast heater by a fan which, like all of the other fans in the system, delivers 6,000 cu. ft. of air per minute.

Carrots quick-dehydrated by the procedure described here have a reconstitution and cooking time of 15 minutes and an appearance and flavor of freshly cooked carrots of the same variety and of the same growing, storage or handling his-

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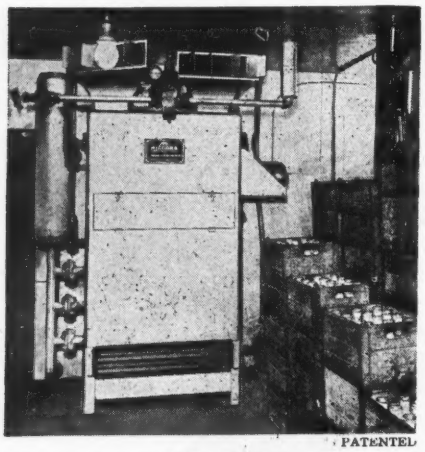

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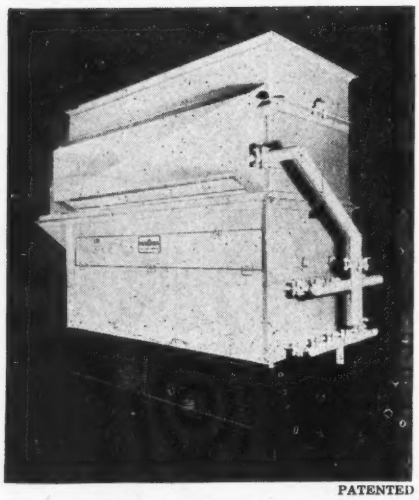

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has saved refrigeration users as much as 35% of the power consumed to operate compressors, has increased plant capacity and saved 95% of condenser water costs. The patented NIAGARA DUO-PASS reduces condensing temperatures, prevents loss of capacity from scale on condenser tubes.

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tory. Carrots are cited as merely an example because of demonstration tests we have observed. They are also one of the dehydrated vegetables ordinarily requiring a "long" reconstitution and cooking time, starting with cold water. They rehydrate as the water heats. There is no "soaking time" for quick dehydrated foods.

—End—

How To Retard Rancidity

(*Continued from page* 86)

As a result of this test, it may be predicted that, at room temperatures, five to six months' additional storage life can be obtained before salt-cured mackerel become rancid to the point of inedibility.

Commercial Test

In conjunction with the War Food Administration, a commercial-scale test pack of salt brine-cured herring was prepared in Gloucester, Mass., in March, 1945. A pack of 50,000 lb. of herring was prepared. It included untreated fish as controls, as well as the stabilized product. Portions of the pack are now being stored in the Subsistence Research and Development Laboratory under various controlled-temperature conditions. Preliminary examinations (Figs. 1 and 2) indicate definitely superior keeping quality of the stabilized portion of the pack, at temperatures of 40 and 75 deg. F. At temperatures of 85 to 100 deg. F., protein decomposition, tissue deterioration and crumbling of the fish flesh were so severe and developed so quickly as to preclude successful storage of brined salt herring at these temperatures, regardless of resistance towards rancidity.

Experimental packs referred to previously were conducted, starting with fresh fish. To determine applicability to fish already brine-cured, a 300-lb. barrel (net weight) of brine-cured bonito (South American), which had been kept under refrigeration since production, was obtained.

A portion of this was repacked after stabilization treatment. Samples, treated and untreated, were placed in storage at room and elevated temperatures. Results indicated definite superiority of the stabilized fish, at 40 and 75 deg. F. storage temperature.

The stabilization technic requires little change from normal methods

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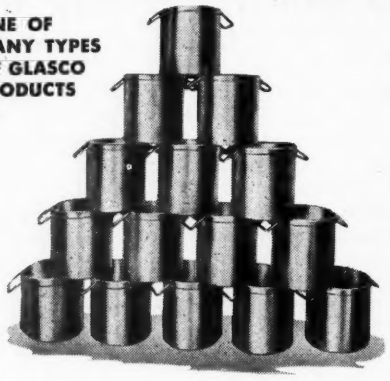

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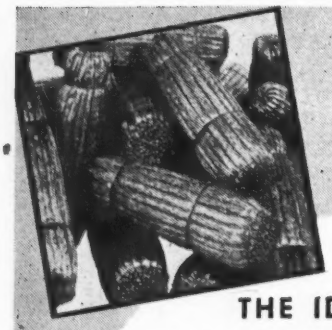

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of production of salt fish products. Integral features are:

(1) The incorporation of 4.5 lb. of benzoate-type preservative—or other approved, nontoxic, equally effective preservative—per 1,000 lb. of salt. This proportion is equivalent to a 0.1 percent concentration based on the weight of the salt plus the fish, using 30 lb. of salt per 100 lb. of fish. A mixture consisting of 50 percent magnesium benzoate and 50 percent benzoic acid gave most consistently satisfactory results. The salt-preservative blend is used in the same manner as ordinary salt in normal salting operations.

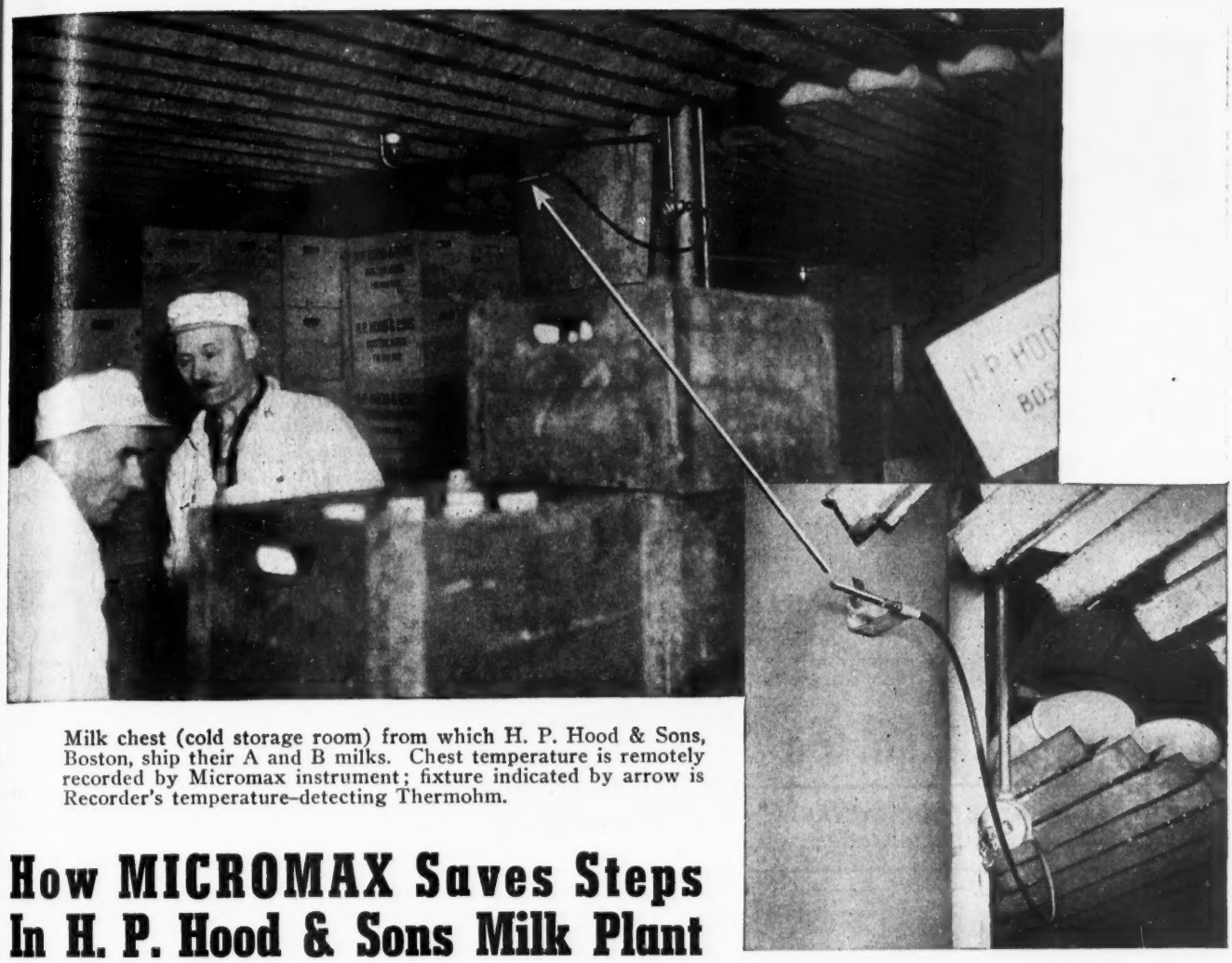
(2) Coating the salted fish with a film of approved vegetable fat containing 0.2 percent, by weight of fat, of nordihydroguaiaretic acid or other equally effective antioxidant.

The cost of stabilization should not exceed 2 cents per pound of final product, 1 cent per pound for materials used and a similar cost for additional handling entailed. The preservative is available in relatively unlimited quantities, and the antioxidant (nordihydroguaiaretic acid) is available at present in a quantity sufficient to process 400,000 lb. of fish per day. Availability of vegetable fat should not prove a problem, even under present curtailed supplies, since only 3 lb. of vegetable fat is required per 100 lb. of fish. The fat remains with the product and is available for consumption when the fish is eaten.

Possible Applications

Preliminary experiments have demonstrated that the antioxidant coating technic is also effective in delaying rancidity and rusting in frozen fish. Adaptation of this technic to the frozen-fish industry would not only result in a significant economic saving by preventing a loss of food products through deterioration, but it would also tend to reduce the cost of refrigeration of fatty fish. Laboratory results indicate that such treatment would permit storage of fish products at higher temperatures equivalent to those used for meat storage, without development of rancidity and rusting, and with the resultant reduced likelihood of dehydration (freezer-burn).

Similar technics could be developed for other products where oxidative deterioration of fats presents a problem, such as already has been done at the Subsistence Research and Development Laboratory on salted peanuts, and on the yellowish discoloration and surface



Milk chest (cold storage room) from which H. P. Hood & Sons, Boston, ship their A and B milks. Chest temperature is remotely recorded by Micromax instrument; fixture indicated by arrow is Recorder's temperature-detecting Thermohm.

How MICROMAX Saves Steps In H. P. Hood & Sons Milk Plant

"It saves us a thousand steps an hour," says the chief engineer of H. P. Hood & Sons, referring to the Micromax Recorder which charts temperatures of storage chests in the milk plant.

Formerly, when mercury or spirit thermometers were used for temperature checks, much time and effort went into the continuous trek from chest to chest. Even so, engineers had only an intermittent guide to correct refrigeration.

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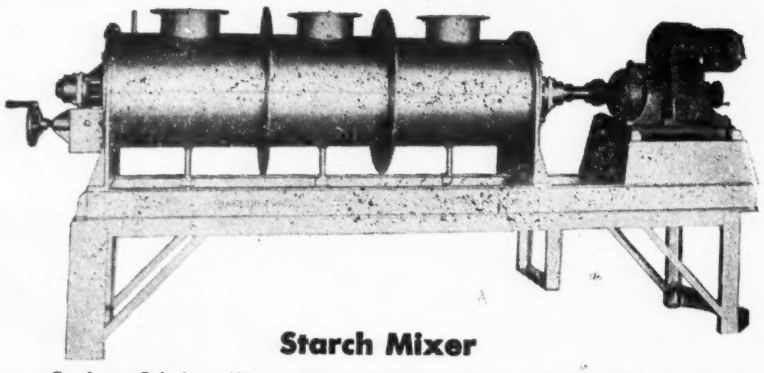

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rancidity encountered in bacon and other smoked pork products.

Much work remains to be done to determine the most effective antioxidant (or synergistic combination of antioxidants) for any given fish product, the best coating material (possibly partially hydrogenated fish oil), the concentration of the antioxidant in the coating material and the coating technic.

Acknowledgment is made to Joseph Puncochar and Frank Piskur, of the Division of Commercial Fisheries, U. S. Fish and Wildlife Service, attached to the Subsistence Research and Development Laboratory, and to Captain LeRoy W. Horne, of the Fats, Fish and Poultry Branch, Subsistence Research and Development Laboratory, for their assistance in this study.

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—End—

Vanillic Acid Esters

(*Continued from page* 90)

with 1.0 c.c. of a spore suspension of a green (unidentified) mold isolated from moldy cream, and incubated at 30 deg. C. The data and results are given in Table V. In addition, photographs of several of the samples are shown in Figs. 2 to 6. Figure 2 portrays the chive cheese spread with and without 0.10 percent ethyl vanillate after four days at 30 deg. C. Figure 3 shows the pimento cream cheese spread, and Fig. 4, the limburger spread under the same conditions. Figures 5 and 6 show the condition of the chive and limburger spreads after 6 days.

The results of this experiment indicate that of all the vanillates tested, the ethyl and *n*-propyl esters were the only efficient ones for controlling the growth of this Penicillium mold on cheese spreads.

Typical of the further experiments, in which only ethyl vanillate was tested against a variety of cheese spreads, are the results found in Table VI, corresponding to an experiment using a green mold isolated from moldy cheddar cheese. These data indicate that ethyl vanillate is very effective in preventing the appearance of this green (Penicillium) mold on all the varieties of cheese spreads tested.

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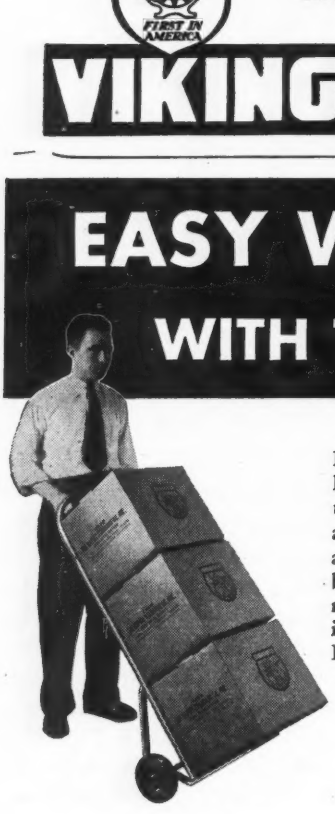

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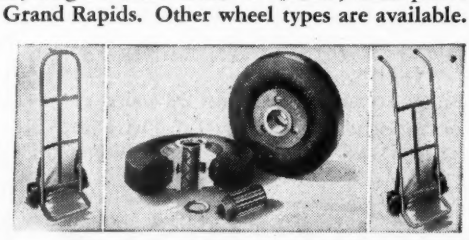

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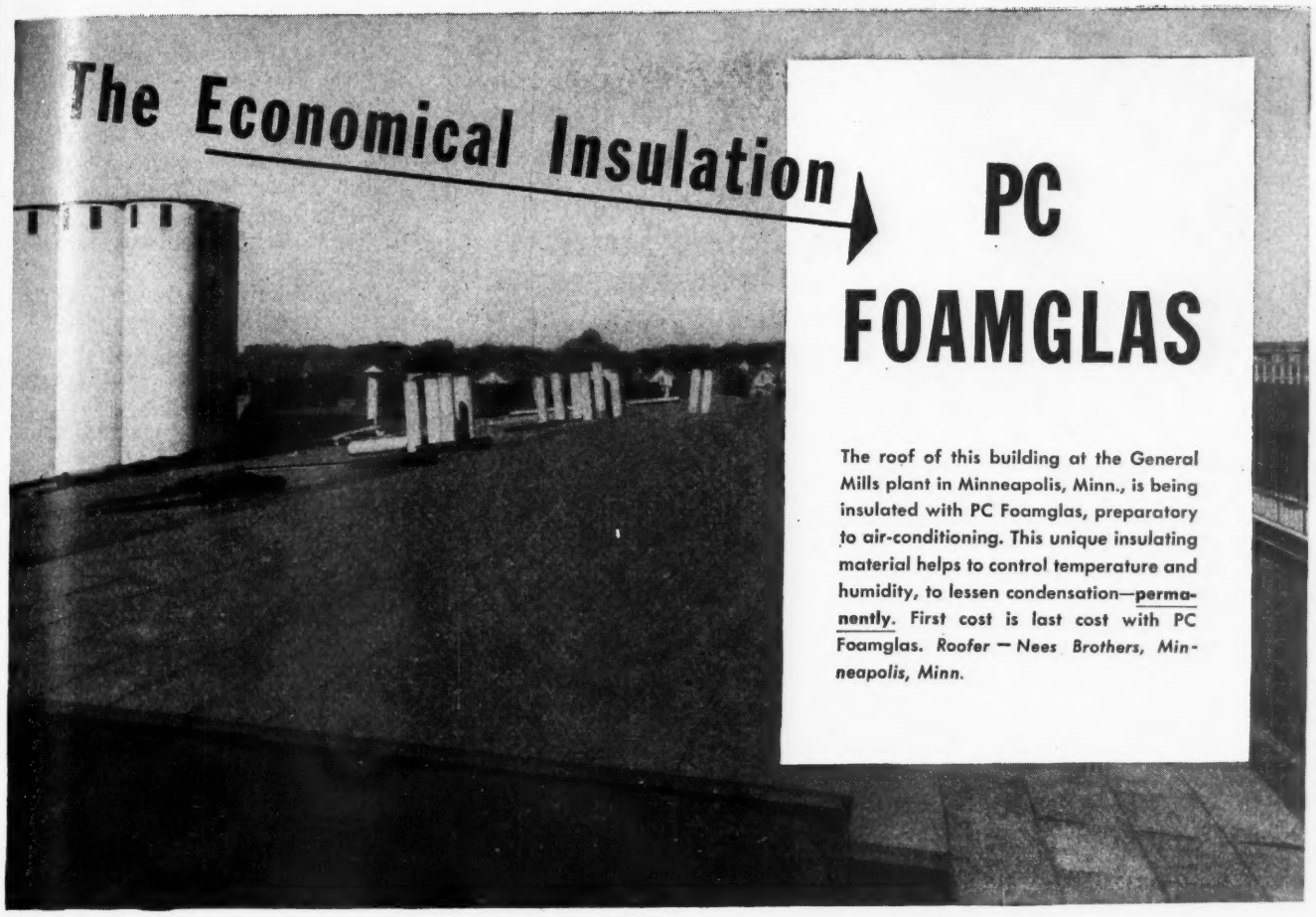
vanillate as a mold preservative in cheese spreads, it must be remembered that these experiments were performed under very accelerated conditions, and that cheese spreads would never be stored at 30 deg. C. Mold growth at refrigerator temperatures is greatly decreased.

In all of these studies, the amount of preservative used was arbitrarily taken at 0.10 percent. That is the amount of preservative called for in the United States Army specifications for cheese spreads. However, it is possible that much lower concentrations of ethyl vanillate would be sufficient for suppressing mold growth in these products.

Fish Studies

Because preliminary tests indicated that vanillates prevented the appearance of the red bacterial growth on fish salted with solar salt, several other experiments on fish were made. Herring was covered with saturated salt brine containing 0.10 percent ethyl vanillate and stored at 100 deg. F. After 4 months, the herring showed no trace of decomposition, whereas the control was in a much less desirable condition.

In another experiment, southern coast mullet was packed under five different conditions and then stored at 90 deg. F. The keeping life of this fish under these conditions, when packed according to existing procedures, is approximately two weeks. The five packing conditions used in this experiment were: (1) Fish packed in brine, (2) fish coated with coconut oil and packed in brine, (3) fish coated with coconut oil containing N.D.G.A. (antioxidant) and packed in brine, (4) fish coated with coconut oil containing N.D.G.A. and 0.10 percent methyl para-hydroxybenzoate and packed in brine containing 0.10 percent methyl para-hydroxybenzoate, and (5) fish coated with coconut oil containing N.D.G.A. and 0.10 percent ethyl vanillate and packed in brine containing 0.10 percent ethyl vanillate. After three months, peroxide values, which give the relative rancidity of the material, were determined. They were: (1), 250; (2), 60; (3), 5; (4), 4; and (5), 2.5. Thus, it is apparent that whereas coconut oil alone reduced the peroxide value just by dilution and N.D.G.A. prevented rancidity, due to oxidation, the preservatives, such as methyl para-hydroxybenzoate and ethyl vanillate, prevented still more rancidity which would be caused by micro-organism. The data show that



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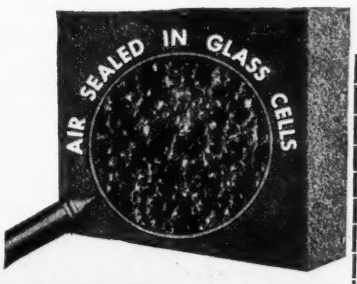

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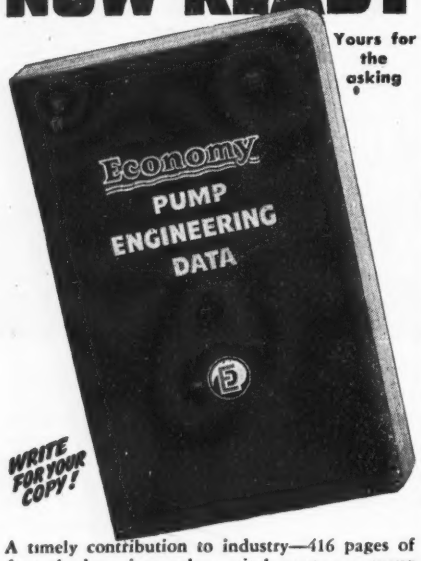

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In another experiment on fish, three samples of commercially packed herring fillets in wine sauce were prepared. One was treated with 0.10 percent ethyl vanillate, one with 0.10 percent isobutyl vanillate, and one was left untreated as a control. The samples were then incubated at room temperature. The results are found in Table VII. This experiment indicates that isobutyl vanillate is very effective in preserving pickled herring at room temperature. It is interesting to note that ethyl vanillate allowed a very slight discoloration and rancidity to develop and then prevented any further spoilage. After 57 days, the vanillate-preserved samples were chilled and tasted. Both samples tasted essentially the same as a freshly obtained sample.

Preservation of Fruit Juices

In an experiment on fruit juices, samples of commercially packed apple juice and tomato juice were treated with a number of vanillates, inoculated with a spore suspension of a green mold isolated from moldy sirup, and then incubated at 30 deg. C. The data and results of this experiment are given in Table VIII. These results indicate that the vanillates, in general, are effective preservatives for aqueous fruit and vegetable juices. *n*-Butyl vanillate made a poor showing because the effective concentration is probably higher than its solubility in the tomato juice.

Other experiments on butter, cheese, eggs, hams, preserves and food wraps are now in progress and will be reported at a later date.

Toxicity studies on ethyl vanillate, using rabbits, guinea pigs and rats, are in progress at the Kettering Laboratory of Applied Physiology of the University of Cincinnati. The work thus far indicates that "administered in olive oil to rabbits or rats, the substances (sodium benzoate and ethyl vanillate) have approximately the same lethal dose." "When administered in aqueous suspension, the vanillate is much less toxic than the benzoate."[6]

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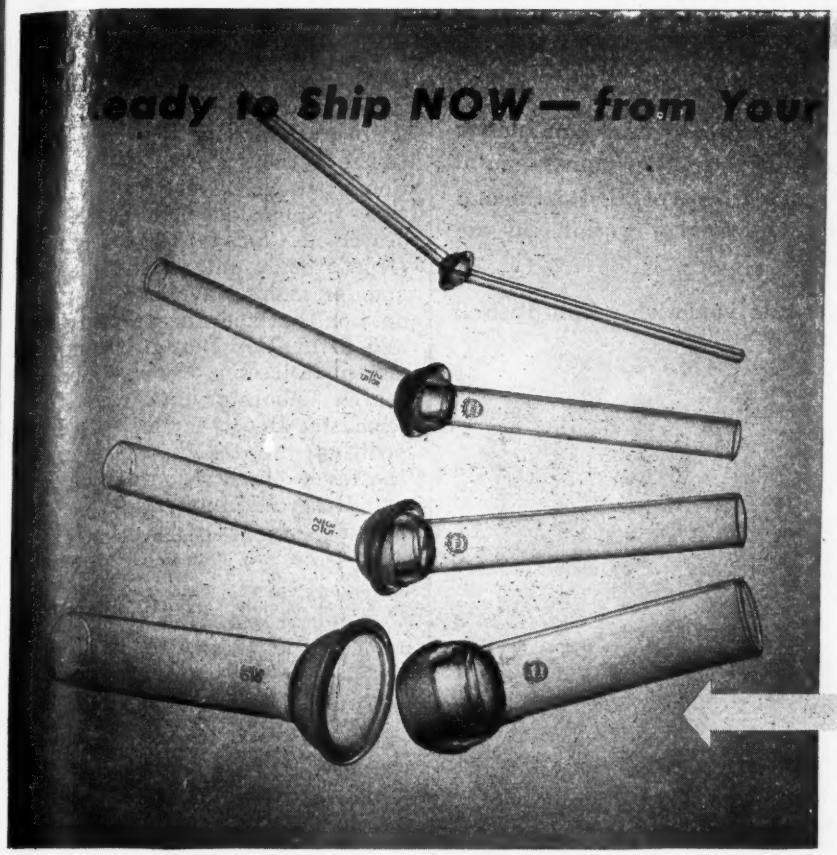

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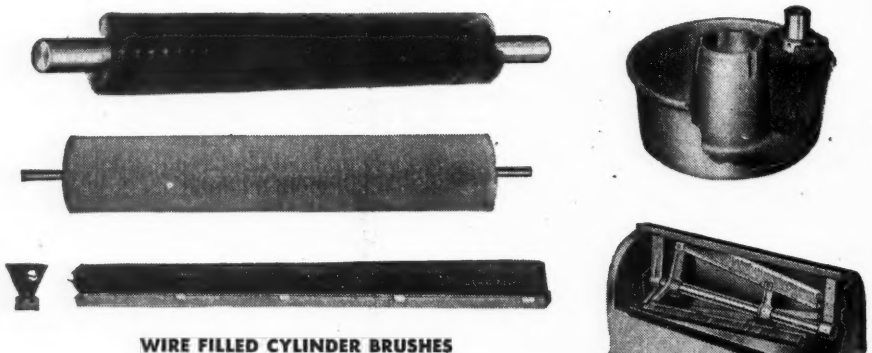

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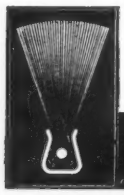

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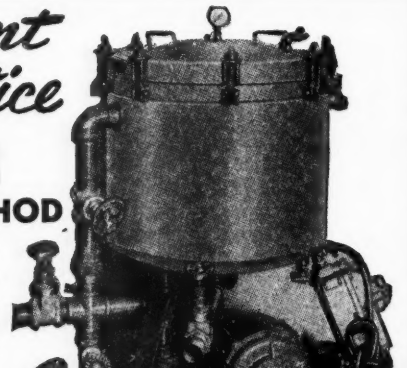

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The authors are indebted to Lt. Comdr. R. E. Silver, Navy Liaison Office, Subsistence Research Laboratory, Chicago Quartermaster Depot, for his interest in this work and for making available to us the data on the experimental fish packs, and to Lt. Col. Don L. Deane, Assistant Director, Subsistence Research Laboratory, Chicago Quartermaster Depot, for his help in expediting the toxicity studies and the favorable reaction of the Food and Drug Administration.

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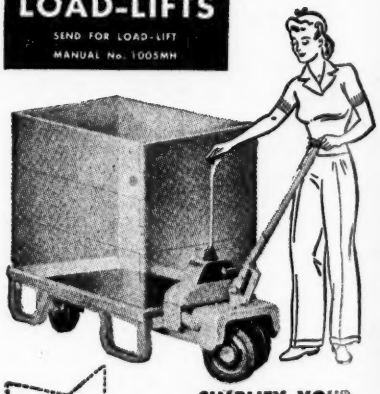

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WHAT DOES AMERICA WANT?

IT IS THE PURPOSE of this editorial, the thirty-first of a series, to state the urgent need for a clear declaration of American policy in world affairs.

Within the past few weeks there has been a wakening conviction in this country that the determination of international arrangements cannot safely be put aside until victory has been won. For we have seen actions taken in Europe seemingly without full consultation and agreement of the Allied powers, which may profoundly affect the design of the post-war world.

A declaration of American policy is needed, and it should be accompanied by a statement of our firm intention to exert full effort to procure its acceptance and furtherance. Emphatically, this does not mean that an American platform should be put forth as an ultimatum, which other nations must accept totally, or reject at the cost of having the United States withdraw from collaborative participation in world agreements and organization. On the contrary, the first plank in such an American platform should be a firm commitment on our part to participate with our associate nations in building a general system of world security and order. By definition, this requires that each participant be willing to accommodate its purely national interests to a program that can be accepted as fairly representing the interests of all. But equally, there is imposed on each participant an obligation to state honestly and openly what it conceives its individual interest to be, as well as its concept of what measures will best serve the general interest.

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Americans have displayed a singular diffidence in the matter of formulating a bill of American objectives—singular, in that it contrasts so sharply with our power to exercise as broad a leadership as we are able to define. This reluctance stems partly from the inherent difficulty of arriving at a coherent statement of national aims in a country like the United States—so vast in area, so multiple in its sectional and group interests, and so soundly committed to the free expression of individual thought. But it stems also, in part, from a tradition of national isolation which, however understandable in historic perspective, now stands clearly discredited by two world wars which were not of our making, but from which we were unable to hold aloof.

That the economic wellbeing and political security of the rest of the world is closely bound to the decision and performance of the United States is questioned nowhere but in America. Political boundaries and restrictions cannot build effective fences against the interplay of economic forces, and the sheer weight of American economic influence is of crucial import to all the other nations of this globe. In large measure their decisions will be shaped either in response to the opportunities that our procedures offer them, or in defense of interests that our procedures may jeopardize.

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The United States contains only about 6 percent of the world's population. But—our national income, before the war, amounted to almost 25 percent of world income; our industrial output as a whole approximates 45 percent of world totals, and we now are producing a like percentage of the world's munitions; we have 35 percent of the world's railroad mileage; 25 percent of merchant fleet tonnage; 50 percent of the world's telephones; 45 percent of steel production; 40 percent of aluminum production; 33 percent of coal output; we are refining (though part of the production comes from imports) 55 percent of the world's copper, and 70 percent of its petroleum; we now are producing 50 percent of the world's rubber (though post-war resumption of natural rubber production will sharply reduce this balance); our shares of agricultural production are, of course, much smaller, but just before the war we accounted for 35 percent of world cotton production, 15 percent of wheat, and 10 percent of wool.

Whether we like it or not, we must exercise political responsibilities commensurate with the weight of our economic power in an inter-dependent world. But before responsibilities can be assumed, they must be defined. Can the United States arrive at a clear agreement and statement of aims for which it is willing to stand sponsor?

The recent campaigns of both political parties have helped to provide an encouraging answer. In general, election mandates are glaringly deficient as indicators of a unified national purpose. A majority of voters declare themselves for the winning candidate. But even among the majority there are varying degrees of enthusiasm for the platform principles espoused by their candidate; and the substantial minorities of the defeated parties may have had no enthusiasm whatsoever for particular planks in the winning platform, or for the platform in its entirety. A sportsmanlike deference to the will of the majority is a feeble substitute for unified national conviction.

But this Presidential campaign was noteworthy for certain basic principles upon which both the platforms and the candidates of the major political parties were

united. Surely, upon such areas of agreement there may be said to have been an American mandate; the more so, because upon certain of them, we have evidence that no party or candidate could have declared opposition with any hope of victory. What then were these agreed-upon principles? The following is an attempt at a fair summary:

1. That America, in collaboration with its Allies, is committed to seeing the war through to the unconditional surrender of our declared enemies.

2. That America is committed to a responsible role in a world security system after the war, including a commitment to lend the support of our armed forces to repel aggressions that may violate such security.

3. That America is committed to the post-war goal of substantially maintaining in this country an economy that will provide jobs for those who are able and willing to work.

4. That America is committed to the principle of achieving this goal of sustained, high-level employment of manpower and economic resources under a system primarily activated by competitive enterprise.

These are American mandates. They can be made the nucleus of a coherent national policy, for they define aims upon which the great majority of our people are emphatically agreed. But no one can pretend that in this generalized form they serve as more than directional guides for either internal legislation or international negotiation. This skeleton of aims must be clothed with the living flesh of agreed-upon means. Here we have no national mandates of comparable clarity, but it is patently clear that it is our compelling task to achieve them.

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On our elected representatives in government rests the primary responsibility for formulating the specific programs required to implement national policies. Under our system of government, those representatives need continuous nourishment in the form of mandates as to what the people want. Particularly during a period when so many urgent problems are being thrashed out upon an international basis, this imposes a grave responsibility upon all sectors of our citizens; for it requires them to think in terms of the welfare of our nation as a whole, to focus upon those points which offer possibilities for substantial agreement among Americans, rather than upon matters of individual, group, or sectional advantage.

In earlier editorials I have tried to define a basis for national policy in keeping with that broad purpose. They have dealt with problems that are basic to the healthy functioning of free enterprise under the competitive system, with the mobilization of our resources for war and for reconversion to peace-time production, with labor and management responsibilities and relations, with national debt and taxation, with foreign trade and our economic relationships abroad, with the industrial development of backward areas. Since they have been presented in the McGraw-Hill publications, which reach a group broadly representative of all American industry, they have centered upon problems that have an economic rather than a strictly political import.

Future editorials, to appear during 1945, will deal with comparable subjects selected in recognition of the urgent importance for arriving at concerted definitions of national policy. I am fully aware that no individual or group can speak authoritatively for the American Nation. But I hope that an honest attempt to formulate sound concepts of national interest in crucial economic matters will help to crystallize American policy both by focusing agreement and by eliciting dissent.

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Here there is space only to indicate in broadest outline what I conceive to be desirable foundations for an economic policy for the United States:

1. The attainment of a high and sustained level of business activity and employment in the United States and in the world.

2. Active and expanding markets for world trade based upon fair competition rather than upon bloc agreements, discriminatory preferences, and cartel arrangements.

3. The encouragement of industrial development in nations that have been backward in that respect.

4. A recognition that hospitality to imports, rather than constituting a threat to national standards of living, offers in fact the most potent instrument for international bargaining that any nation can command.

5. A willingness to assume a responsible national role in international arrangements designed to provide such financial stability as may be needed to support mutually advantageous world exchange of goods and services.

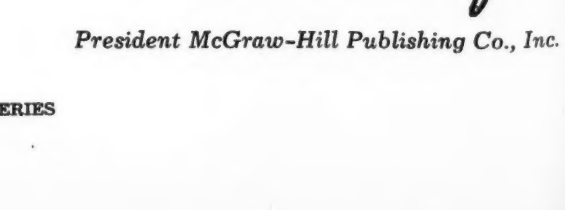
We must see to it that the end of military warfare does not merely open the door to an era of economic warfare.

The fact is that America has no choice but to assume leadership in world affairs. For the weight of our influence will be felt by other nations no less whether our attitude be positive or negative. And the cost to us of any international obligation which we might undertake must in all fairness be weighed against the equally real cost to us of dealing with measures that others may take to protect themselves against the results of our non-participation.

We have tended in the past to approach international commitments timidly, fearful that we might be outwitted in a world battle of wits. And in so doing, we have too often ceded to others the initiative of suggestion, leaving to ourselves the thankless task of accepting or rejecting what they demand of us.

Our one bargaining weakness stems from the fact that other nations, by contrast feeble in potential power, know what they want and are able to mobilize all their strength to achieve it.

America can be the most effective nation on earth — if only it knows what it wants.



President McGraw-Hill Publishing Co., Inc.

THIS IS THE 31ST OF A SERIES

REDEDICATION

An Obligation to Our Fighting Men

DURING the last few weeks we have been forcibly reminded that so long as we still are fighting either of our major foes, first claim upon the productive resources of the United States—its manpower, materials, utilities, and industrial facilities—must be the production and delivery of munitions and war supplies. All other claims are secondary. No responsible citizen would have it otherwise. For in this war even more is at stake than our existence as a Nation. We dare not forget that we are engaged in a struggle that challenges the fundamental values upon which our civilization has been built.

It is not easy to list the values that we are fighting to uphold. They have been clothed in a variety of shapes over the centuries. They will assume new forms in the years ahead. But they have an inner consistency that free men the world over can feel and recognize: the right of the commoner against the noble, the right of the individual against the state, the right of trial by jury, the right to vote, the right to an education, the right to freedom of speech and worship, the right to work in a sphere of one's own choosing, the dignity and the equality of the individual under the law—these are our cultural heritage, painfully won and often precariously held over the ages, always to be rewon, redefined and buttressed by each succeeding generation of men.

The preservation of this vital core of value, and its transmission to our sons and daughters depends upon our victory in this struggle. So those things which are essential to victory must come first. And since the production of war munitions in overwhelming volume and quality can hasten that victory and save countless lives of our fighting men, no effort that will contribute to this end should be regarded by us as a sacrifice.

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The present is no time for self-congratulation upon our achievements either in the theatres of battle or of production. The mounting casualty lists should suffice to curdle the savor of any such indulgence. The most that can be said in reasonable taste and good conscience is that performance in both fields is such as to warrant our firm confidence that we can carry to successful completion the tasks that remain to be done.

Nor is there profit in even observing, much less deploring, that the tasks ahead are more formidable than those which were defined for us a few short months ago. Then, all of us—military leaders, government officials, workers, and business men—were riding a crest of optimism as to an early end of the war in Europe and as to the character and dimension of the war against Japan. Already we had begun to turn anxiously toward the problems of reconversion which then seemed so near at hand. Schedules for war production, based upon the best available estimates of need, called for a 5 billion dollar reduction from 1944 performance, even though we might have to continue a two-theatre war, and for a 40 percent reduction in the event of an early victory in Europe.

Today, those forward estimates have been revised sharply upward. That is true both of the 1945 requirements to meet the needs of a two-theatre war, and of requirements for the Pacific war once the European phase is ended. For this upward revision four chief reasons are responsible:

1. European battle experience has shown markedly greater use of expendable munitions than was provided in the formulae upon which our original production schedules were calculated: the result has been a depletion of inventories on a scale that would become dangerous if allowed to continue.
2. Experience has also demonstrated the need for new types of weapons or increased complements of some existing types to match new enemy equipment or tactics.
3. A less easy optimism as to the early ending of the European war has given rise to a growing disinclination to gamble on the approximate date.
4. An increasing conviction prevails that the war against Japan may require ground-army operations on the Asiatic mainland on a scale greater than originally premised.

But if these changes in the fortunes and outlook of war have raised our estimates of military requirements, may not subsequent favorable changes in the military situation cause them again to be revised downward? It is entirely possible. But our military men have learned that they cannot safely discount what *might desirably happen* as something that *will happen*. Those working on the production front also must learn that lesson. Fortunately, the record shows that we have been able to maintain a war production almost equal to that of the rest of the world combined, even while we produced for civilian use on a scale that has been large even by our

own pre-war standards. So we have ample margin to whip whatever war job may be required of us. As now defined, the task will not be easy. But it *can* and *will* be done.

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What, then, is the production task with which we are charged? Our 1945 production for the two-theatre war now calls for the substantial maintenance of the over-all levels reached in the latter months of 1944. But there is a shift of emphasis. Almost half of the programs for specific equipment items are declining. A few are scheduled to hold level. About 45 percent are scheduled to rise sharply. That means that workers and facilities must be shifted to man the expanding programs. At the same time the armed services are calling for many more men than can be supplied from those who become newly eligible to the 18 year old age group. That means further drafts upon war workers. It means also replacements for them when they are taken from the expanding programs. Finally, events demand that we produce as much as possible of many items during the first half of 1945.

Our task, then, is one of intensified effort for the immediate future, with multiple readjustments at a stage when adjustments are hard to make. Materials for which demand was easing as pipe-lines were being drained in anticipation of falling schedules again are tight as the pipe-lines are being refilled to meet augmented requirements. Men, women, and facilities must be shifted from less essential to more essential tasks. What must be done will be done. But unless there is much voluntary accommodation, it will be necessary for us to suffer a formidable amount of governmental direction which none of us likes, many of us deeply resent, and all of us, when personally affected, volubly protest. The more we police ourselves, the less we shall be policed.

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Even after Germany has been defeated, we shall still face a far from light production requirement to continue the war against Japan. As currently defined this phase might require war expenditures at something like $70 billions a year, an over-all reduction of approximately 20 percent from the $89 billions spent in 1944. Reduction in munitions output would be somewhat greater, probably from 25 percent to 30 percent below 1944 levels. But it is important for us to acknowledge that the reduction is going to be substantially less than the 40 percent previously estimated.

Only a few months ago there were those who questioned sharply the possibility that we might need 60 percent of current munitions output to win the Japanese war. Now the judgment of the military is that 70 percent will be none too high.

Actually the latter level would represent an increase of little more than 50 percent above what now is being produced for the Pacific area. This, certainly, is a modest estimate when we reflect that we shall inevitably more than triple the Army forces assigned to that theatre.

Such a program probably would give us a current munitions supply from three to four times that produced by Japan, but it is believed that we shall need that much to compensate for the advantages derived by Japan from the fact that she will be fighting a defensive war, from the volume of her accumulated stores, from her prepared positions, her shorter lines of supply and transport, and from her large troop reserves, the bulk of which we have yet to meet in battle. Certainly our present 3 to 1 production edge over Germany does not appear to be excessive.

The more modest V-E Day cuts contemplated by the present plan will mean a less acute reconversion problem when they are made, but will leave a greater one to be met at the end of the war. They will mean probably a net increase of not more than 4 million workers available for civilian work during the transition period. Their orderly absorption should present no embarrassing problem. Indeed, we now are warned by Washington that war production following V-E Day may require the protection of considerably closer control than was contemplated under the 40 percent cuts previously expected.

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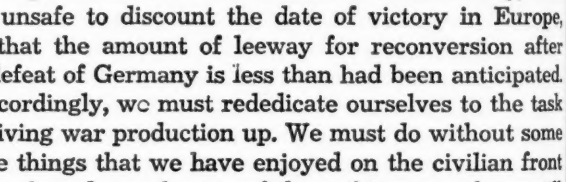
In short, we face for the immediate future a more difficult production job. It is made the more formidable by the fact that we had dulled the keen edge of our will to produce by our premature expectation of a reduction in requirements. Now we are told that the trend of war production for the immediate future is up, that it is unsafe to discount the date of victory in Europe, and that the amount of leeway for reconversion after the defeat of Germany is less than had been anticipated.

Accordingly, we must rededicate ourselves to the task of driving war production up. We must do without some of the things that we have enjoyed on the civilian front rather than demand more of those things; we have still to devote our abilities and energies first and foremost to the demands of war.

Whatever will assure and hasten victory must have first place in any statement of American policy.

Without victory, our aims, and the underlying values upon which they are based, will be extinguished, blotted out by the opposing aims and values proclaimed by our enemies.

The needs of our fighting men must be put first. For, unless we win the war, the National aims and policies of the United States will cease to have meaning in the world.



President, McGraw-Hill Publishing Co., Inc.

THIS IS THE 32ND OF A SERIES

AMERICA WANTS COMPETITION

Only American Initiative Can Preserve It in World Trade

AMERICANS generally agree upon what constitutes a desirable pattern of international economic relationships. We want an expanding world trade, with minimum recourse to government-imposed trade barriers and discriminatory trading arrangements, and offering ample scope for competitive private enterprise. Because they are necessary to such trade, we want also stability of exchange rates, and national currencies that are mutually convertible at least for the settlement of current accounts. We want, too, arrangements to facilitate long-term capital loans with security to the lender and advantage to the borrower.

Few other nations subscribe to these aims with enthusiastic conviction. Some reject them flatly as impractical under the conditions likely to prevail during the postwar period, or achievable only at prohibitive cost to their domestic economies.

Unless, therefore, we can formulate a practical and comprehensive program to carry out our aims, and convince other nations that we will take a sustained and responsible part in making it effective, the international trade of the world surely will be conducted under a system of exchange controls, bilateral agreements, cartel bargains, import quotas, and direct government purchasing arrangements that are the very antithesis of the competitive system that we favor.

To agree upon a concrete American **program**, and to convince other nations that it is to their advantage as well as ours to accept it, is a major task of economic statesmanship. It entails reversing a trend which has persisted since World War I, and which has been intensified during the depression years of the nineteen-thirties and by the exigencies of World War II.

Clearly, that is not a task to be assumed lightly. We can hope to be successful only if (1) we have a deep conviction that what we seek is fundamentally important to the American interest, and (2) if we will take pains to understand why other nations fear that such a program may jeopardize their interests, and then make whatever accommodations may be necessary to resolve their doubts.

An expansive foreign trade policy has been advocated so vigorously and repeatedly in America recently that The Economist (of London) comments wryly upon what it terms the ironic circumstance that "the acceptance of the principles of free trade by the more literate (American) public should come at a time when the doctrines in their simplest nineteenth-century form have been pretty generally emasculated in fact and repudiated in principle by the rest of the world".

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Why are we opposed to managed world trade, and for competitive world trade?

First, we are against rigged and managed international markets because we know that successful participation necessitates a comparable degree of control over the domestic economy as well. There is little debate of this fact, and those nations which accept a managed external trade as a necessary protective measure are generally willing to pay the price in internal regimentation. We are not. For us to do that would be as alien to our genius as it is repugnant to our conviction.

Second, we believe that the United States will be able to compete successfully in world markets, even though we have, and intend to maintain, wage scales far higher than those of the nations whose competition we must meet.

There is impressive evidence to substantiate the soundness of this conviction:

1. Wage scales, of themselves, do not determine the competitive position. They are meaningful only when translated into labor costs, by dividing wage rates by units produced. **A recent War Production Board study shows that in manufacturing industries generally, during the period immediately before the present war, production per man hour in the United States exceeded that in the United Kingdom, Germany and Soviet Russia by a ratio of more than 2½ to 1, and that of Japan by more than 4 to 1.** When comparison is made with available wage data, it appears that our labor costs are generally on a competitive plane.

2. Perhaps the best evidence of our ability to compete in export markets is the record of our demonstrated capacity to do so in the past. **During the entire period between World Wars I and II, the United States consistently commanded a greater share of the world's export trade than any other nation,** although the United Kingdom took a larger percentage of world imports.

3. We have been particularly successful in world trade competition in the export of machinery, vehicles, a variety of manufactured specialties, and certain agricultural products. Except in the last-named field, there is every evidence that we enjoy genuine competitive advantage over other nations, and this advantage will have been increased rather than diminished by developments during the Second World War. It is noteworthy that the goods in which we have been able to compete most successfully have generally been the products of our high wage industries rather than those in which low wages have prevailed.

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It is clear that, on a price basis, we shall be able to compete successfully in postwar markets in numerous lines. It is equally clear that such an opportunity is by no means of negligible importance to our own economy as a whole. During the years in which the censuses were taken between 1909 and 1939, our exports amounted

to from 7 to 16 per cent of our entire production of movable goods. **In the year 1938 our exports in each of the following lines accounted for more than 10 per cent of total domestic production of the particular product.**

(The figures in parenthesis are the percentages of total production exported.)

CRUDE MATERIALS: Phosphate rock (51.5), cotton (30.5), tobacco (29.4).

FOODSTUFFS AND BEVERAGES: Linseed (49.4), dried fruits (36.2), canned sardines (29.4), rice (21.0), fresh pears (15.9), canned salmon (13.8), canned asparagus (13.2), canned fruits (13.0), wheat (12.2), lard (11.7).

SEMI-MANUFACTURES AND FINISHED MANUFACTURES: Refined copper (53.1), paraffin wax (46.3), gum turpentine (42.6), carbon black (40.8), gum rosin (38.0), borax (35.9), crude sulphur (35.6), aircraft and parts (26.8), office appliances (22.3), carbons and electrodes (21.8), printing and bookbinding machinery (18.2), agricultural implements and machinery (17.0), biologic pharmaceuticals (15.3), industrial machinery (14.4), dental instruments and supplies (14.3), automobiles (14.1), benzol (13.3), goat and kid upper leather (12.8), refined lead (12.0), radio apparatus (11.8), caustic soda (11.4), refined mineral oils (10.6).

It is of major concern to all engaged in these lines of activity and in many others that foreign markets be not closed to us. It is particularly to our interest to have export outlets for our war-expanded capital goods and equipment industries. Since we undertook an important percentage of such expansion in order to furnish munitions to our Allies, it is reasonable to ask their cooperation in cushioning what inevitably must be a drastic readjustment here. The case is strengthened by the fact that the postwar world will desperately need the equipment items that we, alone, can supply.

But our demonstrated ability to compete on a price basis will not, of itself, assure us of foreign market outlets. Transportation costs, quality of product, marketing skill, technical and repair service—all are basically important. Still more important are non-discriminatory open markets and the command of dollar exchange by prospective purchasers. Our export potentials will surely be cramped in a world organized on the basis of bilateral deals and exchange controls. The availability of dollar exchange must depend upon the level of American imports and the volume of American capital loans.

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How are we to explain the skepticism of other nations toward an order which to us seems so clearly to represent not only our interest but the long-range interest of the world as well?

Soviet Russia, of course, is committed to conducting its external trade through its central government. But what of the United Kingdom? Why are there so many British voices that counsel the abandonment of what has been Britain's traditional position for more than a century? If we can understand that, we shall understand the dissent from our position of most nations whose economic positions have weakened and whose fiscal problems have multiplied during the two World Wars and the ill-starred period between them.

Essentially, their case is this:

Partly, they were forced into managed external trade policies by the Axis self-sufficiency programs, adopted in preparation for aggressive war. That can be corrected only by crushing the Axis, and by establishing a world security system that will make self-sufficiency a less compelling need.

But primarily, the reluctance of peaceably inclined nations to forego restrictive controls over postwar foreign trade stems from a deep-seated fear that is even more difficult to resolve. They fear, on the basis of past experience, that their efforts to meet payment balances arising from normal foreign trade would force a deflation of their internal economies, affecting prices, credit, wages, and finally employment. Faced with the choice, as they see it, between making adjustments in foreign trade or in their domestic economies, they lean toward the former as, at worst, the lesser of two evils.

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Since the kind of world trade system we seek is dependent upon international arrangements to assure reasonable stability of exchange rates between national currencies, we are challenged to find a formula that both will provide this and at the same time allay what other nations believe are legitimate fears with respect to their domestic economies.

But at least two major steps toward resolving such doubts can be taken upon our own initiative without recourse to the intricate process of international negotiation.

One is the rational overhauling of our tariff system, to provide other nations with increased opportunity to export to us. We can, and should, do this in a way that avoids undue cost to any segment of our economy.

The other, and probably the greatest contribution we can make toward winning a reluctant world to our point of view, will be to offer ample and convincing evidence that we are ready and able to provide a high level of employment in the United States. If we can do that, the rest of the world will wish to expose itself to our influence rather than to insulate against it, since prosperity here is the greatest single contributing factor to world-wide prosperity.

Balance of payment problems are minimized in a world of thriving trade. Britain would have little reason to resort to exchange controls if the total of postwar world imports and exports reaches an 80 billion dollar level. She may well be in a desperate plight if it should revert to the 1935 level of 40 billions.

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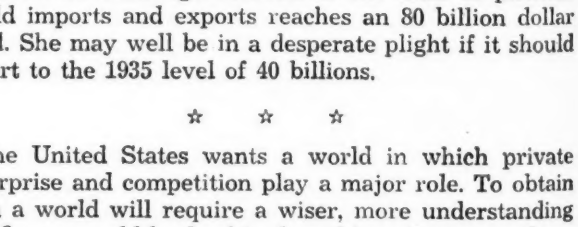
The United States wants a world in which private enterprise and competition play a major role. To obtain such a world will require a wiser, more understanding and firmer world leadership than this nation, or perhaps any nation, ever has exerted heretofore.



President, McGraw-Hill Publishing Co., Inc

AMERICA WANTS PROSPERITY

A BOOK to be published early in April by the McGraw-Hill Book Company carries the provocative title "Prosperity: We Can Have It If We Want It." Its authors, Messrs. Shields and Woodward, state in vigorously challenging terms their conviction that the United States will emerge from war with human, material and technological resources adequate to provide a nation-wide standard of living unprecedented in world history. They present, too, their formulation of the several policies and procedures which must be followed by government, business, and labor if we are to realize our potential for a high and sustained prosperity unmarred by prolonged periods of severe unemployment and business stagnation such as have haunted our economic past.

The specific proposals set forth will elicit both enthusiastic acclaim and acrid dissent, for the book deals in far from gentle fashion with many of the currently fashionable panaceas for assuring prosperity by magic formula. It examines, and discards as effective guarantors of prosperity, whatever their individual merits upon other grounds, programs for public works, slum clearance, subsidizing of small business, foreign loans, social insurance, deficit government spending, redistribution of income, the numerous formulae for monetary management, repeal of the anti-trust laws, or any of the loosely-phrased admonitions that government should do nothing and allow everything to take its course untrammeled by controls of any kind.

On the positive side, the book urges clear recognition of the fact that prosperity, under a system of business enterprise, depends primarily upon the existence of competitive incentives that spur capital investment to provide better tools and equipment, that improve organization and technology to insure continuously increasing productivity per man-hour of work, and that enlarge markets by producing what the consumer wants at lower prices to the end that real incomes may be increased.

In short, prosperity depends upon profitable and expanding business and employment opportunity, so it becomes the part of enlightened government, business, agriculture and labor policy to promote those measures which will forward rather than retard the major aim of expanding production.

However great the room for dissent upon the adequacy, or the phrasing, of the specific recommendations it makes, the approach of this book has one virtue of solid merit. It attacks positively the problem of what steps should be taken to achieve and hold prosperity rather than merely devising a poultice to be applied when and if we run into a decline.

Virtually all responsible spokesmen for government, and for business, labor, and agricultural groups, are agreed upon the goal of prosperity. Moreover, they agree that, insofar as possible, it should be achieved through the effort of private enterprise, with government intervention utilized only as a last resort. But despite this unanimity, almost all public discussion of the problem has concentrated upon the nature, the extent, and the timing of such government expenditures as may be found necessary to combat deflation. Since upon this question there is far from general agreement, our procedure has created an exaggerated sense of divergence in a field in which, so far as fundamentals go, we all are in accord to quite an unusual degree.

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No confusion should be caused by the fact that the generally current phrase for prosperity is "full employment." The latter phrase merely states the goal in terms of human values, which are good terms in which to state any goal. What matters is that we generally are agreed as to what we mean when we say that we want prosperity or full employment. Not only do we know what we mean, but within very rough limits we can give dimension to our concepts. There are a few whose appraisals are somewhat lower, but most competent estimators set the goals for about 1950 at an average annual employment in civilian jobs of between 55 and 57 million persons, with a gross national product of between $185 and $200 billion measured at 1943 price levels. This contrasts with the 1944 level of non-military employed of 51½ million, and a gross output for the end of 1944 of over $200 billion. It assumes a reduction of the average workweek to 40 hours.

It will take some such levels as these to provide employment for those who seek work, with only sufficient "frictional" unemployment (those temporarily listed as unemployed because of the normal turnover between jobs) to afford reasonable labor-market flexibility to both workers and employers. The non-military employment figures are generally consistent with the officially stated postwar goal of jobs for 60 million workers, since the latter figure is generally understood to be an estimate of the *labor force,* which includes members of the armed services and an allowance for frictional unemployment.

There are a number of reasons why the estimates cannot be figured more closely, and why no one can be very confident even of the validity of the stated limits. The chief points of doubt in the employment estimates relate to how many withdrawals there are likely to be on the part of women, oldsters, and youngsters, who now are in the labor force to a number more than 6 millions beyond normal expectancy; how many men will be retained in the armed forces; and whether the

postwar frictional unemployment should be calculated as approximating the current 1 million or the 3 million so-listed in the prosperous year of 1929. Additional uncertainties cloud the estimates of gross national product. Notable among them is the fact that no one is sure of the war's effect upon man-hour productivity trends, in view of the fact that half of our current output has consisted of products that had no substantial counterpart in our peacetime price or production series.

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Nevertheless, despite such qualifications, it is fair to say that we do have a general conception of the magnitude of our postwar goals. Although they are well within our production potentials as demonstrated in this war, they are formidably beyond any previous record of peacetime achievement. Only the most sanguine optimism could lead one to expect that they will be achieved without concerted will, planning, and cooperative effort. Only blind recklessness could engender confidence that once attained they will automatically be held, let alone expanded in normally healthful growth.

If we were to follow past patterns, our war-built boom would, after a period of uncertain length, collapse into disastrous depression. The very magnitude of our recent growth would contribute to the depth and duration of the subsequent trough. Yet a fall even to the level of our previous peacetime-peak-year 1939, has been estimated by The Federal Reserve Board to imply unemployment for between 15 and 20 million persons. If human values have importance, that is something that must not be allowed to occur. If business values have importance, we must not tolerate again such losses as occurred from 1930 to 1933, when sales over the four year period were $128 billion less than would have been provided if the 1929 level had held, and corporate profits declined from more than $7 billions in 1929 to an average annual loss of $1 billion over the next four years. A repetition of these things cannot be tolerated—*if foresight and cooperative effort can prevent them.*

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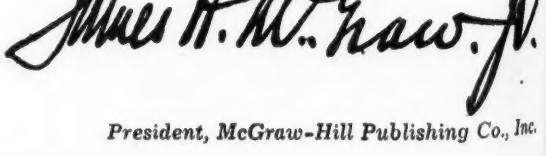
In January of this year Senator Murray introduced in the Senate a bill entitled "The Full Employment Act of 1945." It instructs the President to submit to Congress plans for eliminating both unemployment and inflation, including recommendations for correcting structural defects in the economic system. It provides for a Joint Congressional Committee to consider the proposals of the President, to take testimony from experts and the general public on these proposals or any others it may wish to consider, and after weighing all the facts to submit its findings to Congress. It provides for an advance budgeting of the constituent parts of a full-employment economy, and commits the Federal Government to provide, in advance, for sufficient expenditures (through private contractor channels) to make up for the gap between estimated private expenditures and the amount necessary to assure full employment.

By no stretch of the imagination can The Full Employment Bill, in its present form, be regarded as acceptable to business. Yet it may well present a test of whether or not American business can deal with problems in this area in a statesmanlike fashion. Such statesmanship will consist in demonstrating first, that the Bill is not acceptable because of deficiencies which preclude the possibility of its accomplishing the avowed purposes; and second, that business is able and anxious to offer constructive suggestions for remedying these deficiencies.

It is easy to point to weaknesses in the Bill. To mention only a few of major importance: The proposal to make advance Federal expenditures to compensate for estimated deficiencies in prospective private expenditures is completely impracticable. No one in the country can predict future trends with sufficient accuracy for this purpose; no one can tell what the constituent parts of a really high, *stable* peacetime budget should be, for in our boom-or-bust economy we have no stable pattern to project; no one can tell, within reasonable limits, how much the government should spend *in advance* to assure full employment. The Bill pronounces labor's right to work without defining commensurate responsibilities which it should exercise. It does not define the areas of proposed government expenditure in such a way as to allay business fears of government competition or the general public suspicion of leaf raking. Above all, the Murray Bill is defective in that, despite a somewhat vague pronouncement in favor of forwarding private business activity, it recommends a single specific designed to supplement such activity rather than stimulate it.

The very definition of certain of these faults suggests their remedies. But the positive task of stating how the Bill should be amended in order that it may have effective usefulness is far from simple. Yet it is enormously to the advantage of American business to undertake it. Fortunately, there is a representative group sponsored by industry, The Committee for Economic Development, which has for some time been working intensively upon the problem, and which is excellently equipped to offer sound and progressive advice. It should be used for this purpose.

American business cannot afford to take a negative attitude toward legislation in this field. Some legislation undoubtedly will pass, for the problem is one in which there is a grave government responsibility. But equally there is a comparably important responsibility upon all citizen groups. None of them has more to gain or lose from the rise or fall of prosperity than American business.



President, McGraw-Hill Publishing Co., Inc.

SUSTAINED CONSTRUCTION ACTIVITY

One Step Toward High Level Employment

IN the 34th editorial of this series, it was pointed out that sustained prosperity, based on high level employment, was a major postwar goal accepted by government, management and labor.

That editorial developed the theme that, if the goal were to be approached without undue sacrifice of our essential liberties, we must forego the search for magic panaceas, and follow the harder but more promising course of analyzing step by step, and industry by industry, the measures that might contribute toward the end sought.

This is the first of a number of editorials following such a particularized approach. It will examine the role of the construction industry in forwarding sustained prosperity.

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The influence of construction upon the general level of economic activity is important but not decisive. The claim is frequently advanced that major fluctuations of the business cycle might be ironed out by a properly devised and timed public works program; but any examination of the relatively modest contribution of construction activities to total national output will demonstrate its extravagance.

In the twenty years from 1920 through 1939, the value of new construction averaged just over 8½% of the gross national product. If we add repair and maintenance expenditures, the total is increased to a little over 12% of the gross product. But approximately two thirds of the construction of this period was privately initiated, and only one third was represented by government construction, federal, state and local combined. To expect that we can level out the peaks and valleys of our whole economy through manipulating the 4% portion that is represented by government construction is to expect a very small tail to wag a very large dog.

In fact, the record of construction activity in the past has been on the side of disequilibrium rather than stabilization. In boom times construction activity has climbed to relatively higher peaks than those reached by the economy as a whole; in depression periods it has fallen to deeper troughs. Aside from the special work relief program of the depression thirties, the performance of public construction in this respect is little better than that of private. New government construction mounted with the general trend of the boom from 1921 to 1929, thereby adding its weight to the inflationary trend.

Instead, then, of expecting the construction industry to stabilize our whole economy—a task clearly beyond its power—it would seem appropriate to ask that it look to the more attainable goal of leveling out its own violent fluctuations. If this can be done, many of the most vexing problems of the construction field and of its sphere of influence will be mitigated, employment will be regularized in one important segment of industry where the past record has been particularly uneven, and one aggravating contribution to general business instability will be removed.

The achievement of these highly important, if limited, aims will require the thoughtful, vigorous, and concerted cooperation of management and labor in the construction industry, of a variety of governmental agencies, and of those who direct the sources of construction credit. Of the many measures that must be woven into an ordered program, it is practicable here to present only the broad outline of those which seem to offer the greatest potential usefulness.

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1. Stabilization implies the holding of a balance rather than a freezing at a given level. No rigid formula for a most desirable level of construction activity is possible or desirable. However, it may be accepted as a reasonable initial premise, that we could sustain in the future without major distortion something like the 12% ratio of total construction to gross national product that has been approximated in the past. If it is to serve as an useful reference point, such a generalized premise must be subjected to constant testing both nationally and locally. There must be careful and continuous scrutiny for signs of demand saturation, cost inflation, and labor shortages, all danger signals of far greater reliability than any percentage formula.

The first requisite then is the general availability of information along such lines, far more complete and current than has hitherto been at hand. The second is a general will to hold building activity at a level as high as but not higher than we probably can sustain. Once this principle is accepted, the problem becomes one of marshalling all available instrumentalities to forward it.

2. Public construction, although too small to exert a decisive influence upon economic activity as a whole, can

condition construction trends to a major degree. If, in the decade following the war, government construction approximates its 1920 to 1940 average of one third of all construction, its properly timed impact could do much to level out the construction cycle.

To do this most effectively, public construction should be deferred where and when private building is going forward at a satisfactory pace, and should be started when and where private activity shows undue slack. All government construction does not lend itself to such adjustment. But a large portion of it could be held up for the three to five years which, upon past experience, would provide the necessary leeway to counteract the more violent fluctuations in private building.

Such a program presents numerous difficulties both political and administrative. None should be insurmountable, and the results promise to be of sufficient moment to justify the extraordinary effort that would be required to coordinate federal, state and local government programs. Here is an excellent forum for testing whether or not government economic activity can be made to supplement rather than supplant private effort to serve ends upon which all are agreed.

3. Since private building, postwar as in the past, must supply the preponderant share of construction activity and employment, costs will continue to play a dominant role in determining levels of operation. Wartime restrictions have created formidable backlogs of deferred demand for most types of private, and for many of public, construction. Such demand is so great that it almost certainly will provide the impetus for a postwar building boom of several years duration. There is considerable doubt that in the beginning our building trades, dislocated by war and at low ebb, can organize rapidly enough to carry their share of the anticipated general advance.

However, if former patterns hold, building activity, after a lagging start, will soar, costs will mount, and eventually will saturate effective demand with resultant collapse. That, of course, is precisely the sort of a situation we are seeking to avoid. Crucial to this end is the prevention of rising costs or, better still, the reduction of building costs from present swollen levels.

A recent study by technicians of the War Production Board on the outlook for private housing construction illustrates the point. From 1900 to 1940 the number of housing units built in this country closely matched the statistics of new family formation. The former ran considerably ahead of the latter from 1920 to 1929, and fell behind by the same margin in the following decade.

If the market for new houses were to be similarly limited for the period from 1940 through 1949, the effective demand for new housing during the last five years (1945-1949) is estimated at 3,000,000 units. That is after allowing for houses built from 1940 through 1944, and for vacancies, demolitions, and other factors. If, however, prices could be reduced to 1939 levels, the 3,000,000 unit demand is estimated as increasing to more than 7,000,000 units. Since the latter figure is substantially beyond our production capacity for the period, a backlog would be created that would support an effective sustained demand for the subsequent decade (1950-1959) of 1,000,000 units per year, as against half that amount if rents and sales prices mount with increasing incomes.

The precise accuracy of such an estimate may well be questioned. There can be no question as to the general validity of the point illustrated. The progressive lowering of construction costs will stimulate demand in this field as it has in others. Building management, labor, and their suppliers and customers stand to gain from such a result. Unnecessary restrictions against the adoption of improved technologies and increased productivity should, therefore, be removed, whether imposed by codes of government, regulations of unions, collusion of managements, or inertia of workers. Unless there are compelling social justifications such restrictions must be judged harmful to the whole economy.

4. Numerous other measures could contribute substantially to increased and increasingly stable construction activities. Space remains only to stress the importance of careful consideration for the use of credit facilities as a means of stabilization. In recent years the establishment of the Federal Housing Administration provided a needed stimulus to mortgage lending in the field of housing. The modern pattern of long-term mortgages, providing for regular amortization as well as interest, should be a steadying factor in periods of liquidation. However, there appear to be further possibilities for using credit facilities as a brake when construction activity threatens to climb beyond a level that can be sustained. If public and private lending agencies could devise sound means for raising mortgage rates, increasing down-payment requirements, shortening amortization periods and basing value appraisals upon normal rather than inflated costs, they might exert a healthy influence against the tendency of the construction bubble to inflate until it bursts.

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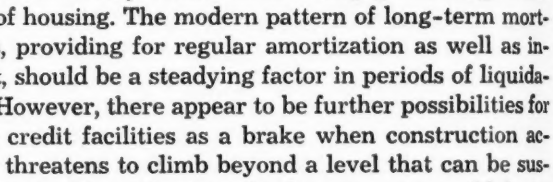
There is no royal road to sustained high level employment. There is not even a single path to assured construction stability—there are many paths, all strait and narrow and all paved with bruising cobbles. This is true for all other major segments of industry.

It is easier to seize upon a magic formula such as monetary control, or deficit spending, or any one of a score of others, than to undertake an intricate task of piecemeal exploration. But only the latter course will lead to prosperity.



President, McGraw-Hill Publishing Co., Inc.

THIS IS THE 35TH OF A SERIES

RUSSIA AND AMERICA

ALLIES—or else . . .

VICTORY in Europe was won only through the combined endeavor of the United Nations. Only through sustained joint effort can the fruits of that victory be reaped.

Without disparaging the truly heroic contributions of others, three of the Allies may fairly be credited with having made the major contributions to victory over the European Axis—the United Kingdom, Russia, and the United States. The close accord of these three nations is no less crucial to the accomplishment of the tasks that remain.

First of these is the war against Japan. It still requires winning. Even without any help from others, the United States could make good this victory, but the war's duration will be speeded by the marshaled effort of the United Nations.

Next, and not less important, is the task of establishing a basis for enduring peace. In this struggle our enemies are more formidable than any we have faced—national ambitions, prejudices, suspicions and distrusts, the staggering burden of tradition and debilitating cynicism born of past failure, the cleaving wedges of divergent languages, thought patterns, economic creeds and procedures—an array of difficulties as baffling as fog and as formidable as a deluge. They can be vanquished only by a continuance of the working accord between the United States, Russia, and Britain that was forged on the anvil of European conflict.

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This high appraisal of the decisive importance of the Big Three in determining the destiny of the United Nations organization, in no way depreciates the importance of the role to be played by France, by China, or the other freedom-seeking nations represented at San Francisco. All of us are committed to the building of a genuinely representative security organization in the conviction that by such means alone can we possibly achieve a just and lasting peace. But the strength of any international machinery will depend upon the validity of Russian-British-American cooperation. If these three are able to achieve substantial harmony of aim and procedure, a world organization that includes them can operate with effective coherence. If they pull apart, the United Nations will break up into competing and jealously hostile blocs.

This is inevitable because of the sheer weight of these three nations in the world's affairs. Between them they account for perhaps half of the world's income and from two-thirds to three-quarters of its industrial output. Once Japan has been crushed, they will control an overwhelming preponderance of the world's armed might. Each of them will wield military power on a scale quite beyond the power of any embryo security league to hold in check. Only if all three are resolved to keep the peace and to enforce it through the Security Council, can that body hope to accomplish its aim.

Although there is a tendency on both sides of the Atlantic to indulge somewhat recklessly in mutual criticism, the ties between Britain and America are too firm to be severed by any foreseeable strain. But that has not been true of our relations with Russia. Even while fighting a war in which our respective ways-of-life were at stake, the inestimable services of each to the other were rendered as friendly but independent associates rather than as fully trusted partners. Now again, as we approach the difficult and vitally important task of building a world organization and of devising a European peace, the task of our delegates is complicated by national attitudes under which each hopes for the best from the other, while fearing the worst.

But the stakes for us both—and for the rest of the world—are too high to be played for in a diplomatic poker game. Russia has no inhibitions in demanding what she wants, and our own vital interests must be stated and upheld with undeviating firmness. Yet we both must face the stark fact that few advantages that either nation might gain at the cost of dissipating the good will of our wartime association could be worth the price thus paid.

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The first steps toward establishing confidence lie in a frank recognition of what may contribute to the lack of it and in a definition of what can be done to restore it.

1. *Probably the greatest single area of reciprocal distrust between Russia and our own country is based on the fear of each that the other may try to interfere with its domestic, economic, and political affairs.* Each purports to see the beam of meddlesome intervention in the other's eye, while it ignores the mote in its own. Thus the Soviet Union remembers that we participated in the foreign military intervention at the time of her civil revolution, and afterwards lent our support to successive boycotts of her trade, of her gold, and of her credit needs. For our part, we remember the Soviet Union's doctrine, and

aggressive support, of revolutionary international communism.

We feel that Russia should find satisfactory evidence of our present willingness to have her develop her internal institutions as she will in the aid that we have given her during the war, and in the record of our good-neighbor policy as applied to Latin America. She, no doubt, resents our lingering suspicions in the face of her declared policy of 1941 to refrain from any attempt to influence the political or economic structure of foreign nations. Certainly, each of us will need the repeated reassurance that can come only through sustained performance by the other in the years ahead. Meanwhile, much will be gained if each will give to the other's good faith the benefit of the doubt, while it scrupulously guards its own conduct to avoid even the appearance of backsliding.

2. *A second zone of suspicion is created by those measures which each of us interprets as natural and necessary bulwarks of national security when they are our own, but as evidence of dangerously aggressive imperialism when taken by the other.* In our view, at least, such demands as we have voiced for island trusteeships or for other naval bases appear mildly conservative as compared with Soviet claims for annexation of territory and for a general orbit of influence, under governments friendly to her, throughout eastern Europe in particular.

There can be no easy solution to that problem. Bi-focal vision, by which one nation can look through a second lens ground to the prescription of another, seldom is achieved in international affairs. The success of the San Francisco Conference will provide a mechanism for international definition of principles and procedures which at least might relieve the inevitable strains. Most important will be the record of how each of us proceeds in our respective courses of action. Soviet performance thus far is highly unsatisfactory to us. While we have taken pains to clear our procedure with her, she has taken action in the Baltic, in Austria, and in Poland without even advance notice to us.

A major test of our ability to cooperate may be found in the Allied administration of conquered Germany. The proposed four-headed control of a four-way partitioned nation promises to be at best an extremely awkward mechanism of administration. At worst, it can result in continuous and dangerous bickering between the representatives of Britain, France, the United States, and Russia in the Berlin coordinating center, and in hopelessly divergent procedures in their several zones of administration. There will be a compelling need for all of us to exercise all of the wisdom and cooperative resolve that we possibly can muster.

3. *A third testing ground for the future of American-Soviet relationships will be defined by the course of Russia in our continuing war with Japan. We are not unmindful of the toll paid by the Soviet Union in its magnificent European war effort. But we still are locked in a desperate struggle with an enemy that exemplifies the Fascism which America and Russia equally denounce. And that war is being fought in an area where Russian interests are importantly at stake.*

Russia has an extraordinary opportunity to create good will by throwing her weight speedily and effectively on our side. There is no doubt but that the final Pacific settlement will generate problems comparable with those of the European peace, but it is equally certain that the continuation of the European comradeship in arms can do much to promote an enduring and confident postwar friendship.

4. *A fourth, and highly important, potential source of suspicion and irritation is the intellectual blockade that the Soviet Union has maintained against the free flow of travel, intercourse, and exchange of ideas.* We can understand the genesis of this policy and the reasons for its continuance while Russia entertained a constant fear of attack by powerful enemies. But the sustained perpetuation of such a quarantine by so strong a nation as the present U.S.S.R. could not be accepted as a protective measure. Inevitably it would generate suspicion that it was rather an instrument of nationalistic isolation or even of contemplated aggression. A way-of-living, at arm's length, with a nation that maintains such intellectual quarantines is possible; any whole-hearted partnership of effort is quite impracticable.

5. *Trading between a free-enterprise nation and one that operates all foreign commerce as a government monopoly can give rise to many frictions.* That subject is too complicated for exposition here. Suffice it to say that, while difficult, it is not impossible to conduct such trade with mutual advantage. We are in a position to help Russia greatly with her program of industrial rehabilitation and expansion at great saving of cost in terms of her current scale of living. In return, we must have assurance that her government monopoly trading will be conducted for commercial rather than political ends, and that it will be used to encourage rather than to restrict multilateral and non-discriminatory world trade.

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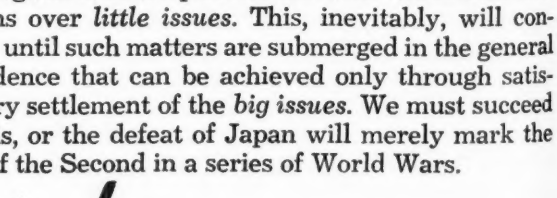
This is a representative list of the major areas in which misunderstanding and distrust may be generated, or allayed, in Russian-American relationships. No doubt, an equally honest list drawn by a citizen of the Soviet Union would be more heavily weighted by those features of our behavior which irritate and stimulate distrust on their side. If such a catalog were to be presented, it should receive our most searching and responsible consideration.

For it is of utmost importance that our two nations, in concert with the other United Nations, learn how to get along in mutual confidence and respect. Our understanding of each other now is so imperfect that our negotiations are punctuated with continuous irritations over *little issues.* This, inevitably, will continue until such matters are submerged in the general confidence that can be achieved only through satisfactory settlement of the *big issues.* We must succeed in this, or the defeat of Japan will merely mark the end of the Second in a series of World Wars.



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STEADY JOBS *and* EQUIPMENT BUYING

SUSTAINED employment is not an attainable goal unless we can moderate the erratic fluctuations which have characterized the markets for producers' equipment in past periods.

In the 35th editorial of this series, "Sustained Construction Activity", it was pointed out that there is no specific that can cure our economy of its "boom-or-bust" proclivities. Rejecting the notion that the construction industry could be so managed as to stabilize business as a whole, that editorial stressed the important contribution it could make to that end, and suggested several practical expedients through which construction activity might be regularized.

Producers' equipment represents an area of production quite as broad and diverse as construction, though smaller in aggregate value. The classification embraces all types of durable equipment bought and used for profit—locomotives, motor trucks, electric generators, conveyors, machine tools, farm implements, and so on down to surgical instruments and dentists' drills.

Although the output of such equipment averages over a long period only 5 or 6 per cent of the nation's total output, it resembles construction in its extraordinary ups and downs. While its component items differ widely in the amplitude and violence of their fluctuations, the class as a whole is one of the most unstable sectors of the economy, making therefore a quite disproportionate contribution to the cyclical swings of total production and employment. From 1929 to 1932, for example, the decline in the output of producers' equipment (at constant prices) was 65-70 per cent, in contrast to a decline of 25-30 per cent in the national output exclusive of such equipment and construction.

A more recent example of the volatility of demand in this field may be found in the movement of a monthly index of orders for industrial equipment, which rose from 92 in the spring of 1936 to 160 in the spring of 1937, falling thence to 65 in the summer of 1938 and rising again to 142 in the fall of 1939. Such fantastic oscillations present an obvious and inescapable challenge to all concerned with economic stabilization.

Not only are these fluctuations bad for the economy; they represent demonstrably bad buying policy on the part of the purchasers of equipment. Peaks in demand come characteristically just before a business depression (1919, 1929, and 1937, for example) when machinery costs the most to buy and install and when it has the lowest expectancy of continuous use. At exactly the wrong moment everyone wants to buy. In the depression itself, on the other hand, with costs down, and with nowhere for the economy to go but up, equipment is a drug on the market. No one wants it when it is cheap and has the greatest prospect for steady employment. Here is a behavior pattern so profoundly irrational there must be hope for its correction.

There is an inveterate tendency for business management to forecast the future simply by projecting the trends of immediate past. Although it is axiomatic that the chance for an extended period of further prosperity is inversely related to the duration of the prosperity already experienced, this truism is generally ignored. The longer the boom has run, the more certain is business management that it will continue indefinitely. Convinced at last by "actual experience" that prosperity is here to stay, executives give the green light to commitments for expansion and modernization previously deferred in a skeptical attitude of "wait and see". The result, so often repeated in our economic history, is an explosive burst of demand for equipment coincident with, and contributing to, the final spasm of a boom. Witness the phenomenal rise in industrial equipment orders during 1928 and the spring of 1929.

The same prophetic illusion works in reverse during a depression. Recent experience is projected into the future. Although the mathematical probability of an imminent and prolonged period of prosperity increases directly with the duration of a depression, it finds little reflection in business decisions. Timidity and caution are the order of the day.

Compounding the errors caused by faulty perspective, are a number of influences which make it extremely difficult for individual enterprises to follow a policy geared to sensible long-term considerations. In a boom, particularly in its climactic phase, most producers find their order books crowded beyond the potential of their current capacities and are faced with the alternatives of expanding or losing trade to competitors. In depression the situation is reversed, and producers with unused facilities find it difficult to justify increases in their capital charges.

An even more controlling factor in many cases is the availability of funds. This is especially important

for small concerns. Typically such firms enjoy but limited credit, and with no ready access to the securities markets, their capital expenditures depend primarily on earnings. When they are making money, they can afford to buy equipment; when they are losing, they largely disappear from the equipment market. Even great enterprises, though less dependent on earnings as a source of capital financing, are profoundly influenced by the volume of internal funds available for the purpose, a volume as a rule far greater in prosperity than in depression. Moreover, it is usually easier in good times to obtain outside funds through the sale of stock or by borrowing, since in bad times bankers, underwriters, and investors are susceptible to the same timidity and caution that afflict business management generally.

We are dealing here with a combination of psychological, physical, and financial forces which conspire to aggravate the instability of demand for capital equipment. What can be done to reduce this instability and thus to bring equipment purchasing into a more sensible and constructive pattern?

There is no panacea, no royal road to the solution. The problem has been with us since the beginning of the industrial economy. It is complex and difficult. It is not, however, wholly intractable. We may reasonably hope that industry will, through intelligent effort, make substantial progress toward a satisfactory solution. The industrial equipment field is one in which government, except for war periods, has exerted little direct control. The best insurance against the institution of government measures is to so conduct activities in the equipment field that no justification for government interposition can be made.

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1. The first and most important step is for industry itself to reconsider its heretofore haphazard and opportunistic policy in the purchase of equipment, substituting so far as possible a regularized, long-range programming of expenditure that will resist both the excited long-buying of booms and the equally disturbing underbuying of depressions. Such long-range programming is particularly appropriate and advantageous for large enterprises in established industries such as railroads, electric power, steel, automobiles, and the like, but it makes sense much more generally.

Once executives come to realize that a reasonably stable equipment program contributes not only to the welfare of the economy but also to the lowering of their long-run equipment costs, the opportunity to combine a public service with private advantage should induce them to recast their policies accordingly.

There is an even more compelling reason for purchasers of industrial equipment to do everything possible to regularize their demands. Some concerns unquestionably will find themselves in a postwar position where speedy delivery of needed equipment, even though it involves the payment of premium prices, will seem to be justified. But there is no system of accounting that can show it to be a profitable transaction to promote an equipment industry boom that runs a brief course only to collapse when the backlog of deferred maintenance and development has been satisfied. That, historically, has been the trigger which trips the door to the depression phase of the business cycle. No immediate advantage can compensate for the contagious paralysis that infects all business enterprise when major layoffs occur in any major segment. No precautionary measures, self-imposed by business, can be regarded as unduly severe if they can prevent this devastating blight.

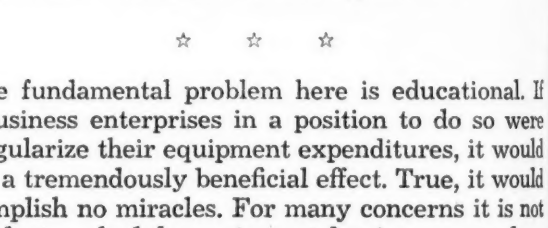
2. Financial agencies can and should play a responsible role in regularizing equipment demand. Funds for the purchase of producers' equipment should be offered boldly and at low interest during depression periods, and should progressively tighten as a boom market bids up the price of purchase and installation. Banks and financial houses have excellent facilities for gathering and interpreting market and general economic information. It is good business for them, and for the national economy, to exercise their accepted discretions in a manner that will help to promote economic stability.

3. There now is almost universal recognition of the need for a thorough-going revision of our corporate tax structure to the end that effective incentives may be offered for private capital investment. The possibility of including provisions which would offer special tax concessions to equipment investments made in depression periods is worthy of intensive exploration.

☆ ☆ ☆

The fundamental problem here is educational. If all business enterprises in a position to do so were to regularize their equipment expenditures, it would have a tremendously beneficial effect. True, it would accomplish no miracles. For many concerns it is not feasible to schedule equipment buying over a long period. Even those who do schedule it are likely in practice to attain only a relative stability. It must be acknowledged, moreover, that few programs could withstand indefinitely a very deep and prolonged depression such as we had in the thirties. Nevertheless the adoption of stabilization policies where feasible would make a signal contribution both to the restraint of booms and to the mitigation of depressions. Here is something industry can do for itself.

It is easy to disparage such remedies for economic instability as are here proposed on the ground that they are partial only. However, joined with others also partial, they can achieve in combination a solid progress toward the goal of sustained high level employment—progress that is unattainable through economic cure-alls. The road suggested is a slow road, and difficult, but it leads upward.



President, McGraw-Hill Publishing Co., Inc.

THIS IS THE 37TH OF A SERIES

FREIGHT RATES *and* INDUSTRY LOCATION

A SIGNIFICANT decision, announced by the Interstate Commerce Commission last May, will take preliminary effect on the 30th of August. It will eliminate some of the advantage in freight rates which Eastern shippers have enjoyed over shippers of the South and West.

The decision has been enthusiastically hailed as an Emancipation Proclamation for industrial development in the South and West. It has also been roundly condemned as a meddlesome control measure that ignores valid differences in haulage costs, and recklessly blots out one of the important factors in determining the location of American industry.

Cooler appraisals indicate that the net effect of the rate changes will be far less drastic than predicted by the more passionate advocates or adversaries. Nonetheless, it is important for the business world to be informed both upon the principle at issue, and upon the forseeable consequences of the ICC ruling.

What The Decision Calls For

The Commission's order, unless modified, or successfully contested in the courts, will require: (1) the eventual establishment of a single freight classification, or grouping of commodities for rate-making purposes, for application throughout the United States; (2) a single level of *"class rates"*—or rates established for groups of commodities and primarily applying to manufactured and semi-manufactured articles of high value—in the area east of the Rocky Mountains. This level is to be about 15 per cent higher than the present Eastern scale.

Because it will take some time, probably several years, to work out a uniform classification in place of the three major classifications now existing, a preliminary adjustment is provided.

Under this adjustment the existing classifications will remain in effect, but the rates on articles moving on *class rates* will be increased 10 per cent in Eastern or Official Territory—the area east of Lake Michigan and the Mississippi River and north of the Ohio River. On the other hand, the rates will be reduced 10 per cent on articles moving on class rates in the South and West, and on those moving interterritorially.

What The Problem Was

At the present time there are marked differences in the levels of the basic scales of class rates in the five major rate territories—Eastern or Official, Southern, Western Trunk-Line, Southwestern, and Mountain-Pacific. It is difficult to average the levels of rates, but if the level of the class-rate scale in Official Territory is taken as 100, the levels in the other territories may be roughly considered as follows: Southern, 139; Western Trunk-Line, 128, 146, 161, 184 in Zones I, II, III, and IV, respectively; Southwestern, 161; Mountain-Pacific, 166.

These are over-all comparisons. On many individual articles the differences in levels of rates are greater or less than indicated because of offsetting differences in regional classification schemes. In many cases, the use of exceptions to the classifications and of special commodity rates has reduced the regional disparity in rates. In fact, on some articles, particularly on certain low-grade traffic such as logs, pulpwood, bricks, coal, sand and gravel, the South and the West have actually had lower rates than Official Territory. The rate disadvantage of the South and West has been principally on manufactured articles.

The territorial differences in class-rate levels have complicated the problem of constructing rates from a point in one territory to a point in another. Today, such a rate tends to represent a blend of the levels in effect at the place of shipment and at the destination. Thus manufacturers and dealers in a higher-rated territory are likely to see themselves at a disadvantage when they attempt to sell goods in a lower-rated territory against competition located there.

Now, if differences between territorial rate levels are removed, the *inter*territorial freight-rate problem largely disappears. So it is an important question whether such differences are justified. The Commission has found that they are *not* justified either by differences in transportation costs or by

other valid considerations. From that finding came the order to establish a uniform level of class rates and a single freight classification.

The Decision And The Map Of Industry

What effect will this decision have on the location of industry in the United States; and what effect will it have on the economic development of the East, the South, and the West?

Today, many in the West and South believe that their higher class rates have seriously retarded the industrial development of these areas, and promoted the concentration of manufacturing in Official Territory. They point out that Official Territory has over 50 per cent of the population of the country, had nearly 70 per cent of the persons employed in manufacturing in 1940, and accounted for nearly 73 per cent of the "value added by manufacture" in 1939. Boasts of industrial development in the South, and to some extent in the West, in recent years are accompanied by claims that this would have been greater but for the freight rate structure.

Another point gets into the argument. Official Territory is not only the country's most highly industrialized section, but also its greatest consuming territory. It is the market which nearly all manufacturers desire to reach, particularly when they have a surplus to sell. Here again is occasion for an outcry by producers outside of Official Territory against the consequences of their high rate levels and the levels of interterritorial rates. Under the circumstances it is not strange that the South and West have argued long and volubly for mile-for-mile equality in rates.

Those in Official Territory deny that the South and West have been handicapped by the rate adjustment, but at the same time look with apprehension at the loss of their rate advantage.

What's The Effect?

However, now that the ICC's ruling is about to be put in operation, it is time for the colorful statements of the debating period to give way to a sober appraisal of what the consequences are likely to be.

In the first place, it should be noted that the preliminary adjustment will affect only a small fraction of the traffic. Estimates indicate that only about 4 per cent of the full-carload traffic moves on regular class rates. About 11 per cent moves on exception ratings which are not affected by the preliminary order; and about 85 per cent moves on commodity rates, which were not within the scope of the Commission's decision. The proportion of less-than-carload lot traffic affected is much greater, since a large part of it moves on class rates; however, less-than-carload traffic constitutes less than 1½ per cent of the total tons carried.

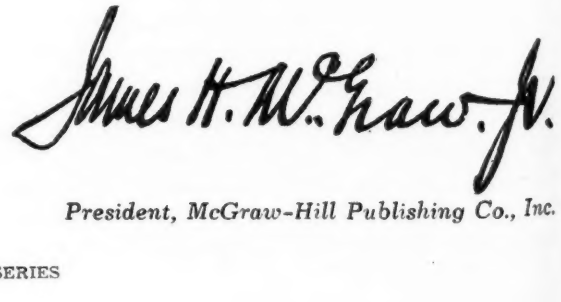
The permanent rate structure will probably affect more traffic than the preliminary order since, in the establishment of a uniform classification containing more classes than at present provided, many articles now moving on exception ratings are likely to be brought within the scope of the classification, and the same may be true of some articles moving on commodity rates.

But, even if a large proportion of the traffic were affected by the Commission's order, or if the principle of equality in rate levels is eventually extended to much of the traffic moving on commodity rates, these freight-rate adjustments cannot be expected to revolutionize the pattern of industrial location in the United States.

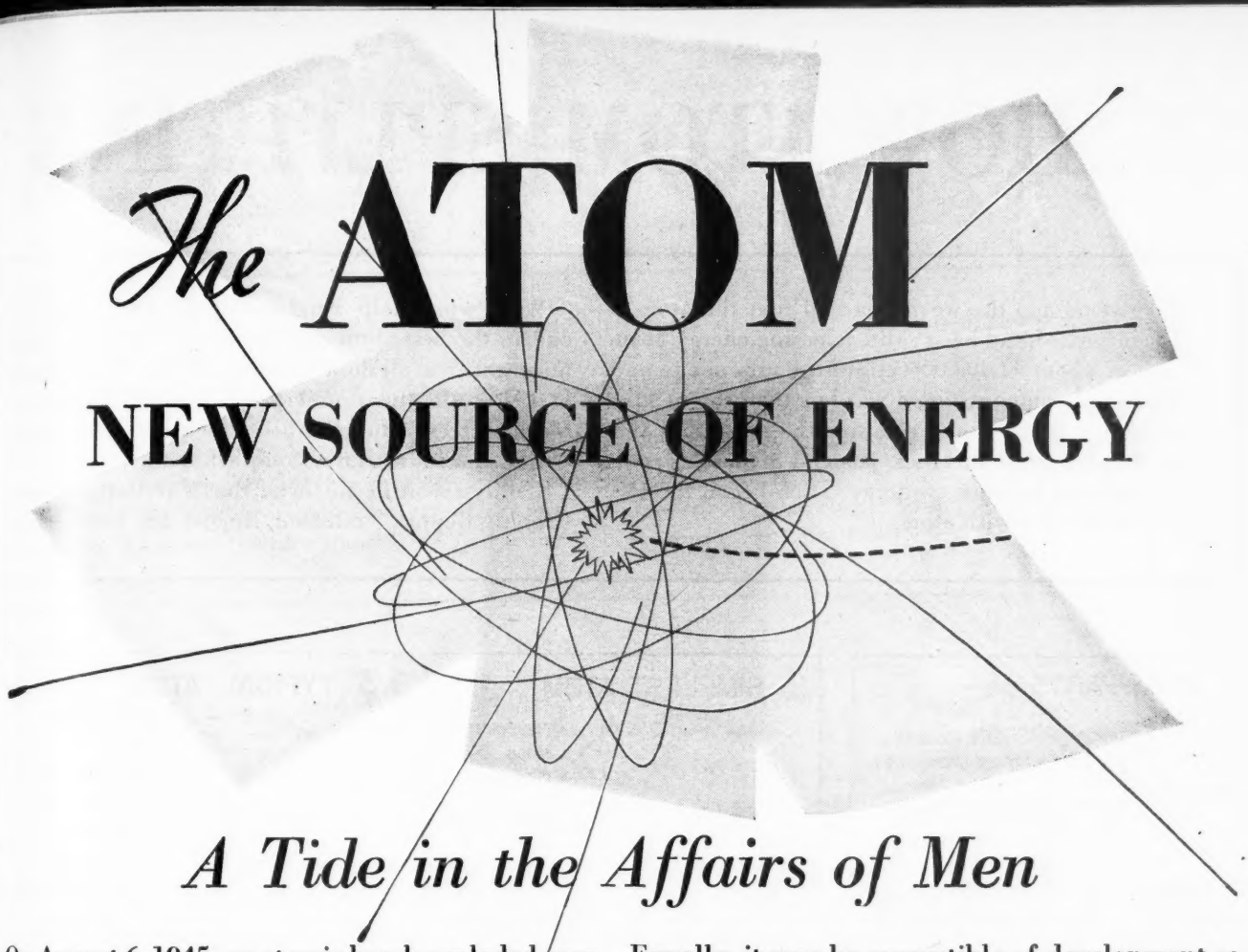
It seems evident that most industries now found in Official Territory are located there for other advantages than that of a lower level of freight rates, undeniable as such an advantage is. Insofar as that is the case, they have little to fear from equalization of the rate levels. For those which have, indeed, been dependent upon preferential rates and otherwise badly located, the removal of the preference and their consequent shift to some area possessing a real locational advantage would be desirable from the point of view of the national economy.

While the high degree of industrial concentration in Official Territory does not rest on such a flimsy basis as a lower level of class rates, the Commission's decision does remove one existing handicap to the growth and development of the South and West. The new adjustment should permit all sections of the country to develop the industries for which they have natural advantages. It should contribute to a sounder regional specialization than we have heretofore had.

This decision will neither destroy the economy of the industrial East, nor will it, overnight, assure the industrial flowering of the South and West. It constitutes one sound step toward establishing that equality of opportunity for all sections of the country which is essential to a nation that bears the proud title of The *United* States.



President, McGraw-Hill Publishing Co., Inc.



The ATOM
NEW SOURCE OF ENERGY

A Tide in the Affairs of Men

On August 6, 1945, an atomic bomb exploded over the Japanese city, Hiroshima.

Its concussion blasted the city, vaporized the fibre of Japan's will to resist, and flashed across the world a light of such glaring intensity that even blind eyes could glimpse the forked road that is presented to humanity's choice and destiny.

It has been a scant fifty years since Pierre and Marie Curie embarked upon their research with the avowed intent of discovering "how the atoms of the universe are put together". Their work contributed radium to the knowledge and use of mankind, but it marked only a way station upon the awesome quest which they announced and which thousands of scientists have since pursued.

Under the compelling stimulus of war, the first major application of the release of atomic force has been in an instrument that raises by an unimaginable dimension our ability to dole out death. We can be devoutly grateful that the scientific leadership of the Allies, and particularly the industrial strength of the United States, brought to us, rather than to our enemies, priority in the development of this dread weapon. But even in its present infant phase, it is clear that ownership of the principle of the atomic bomb carries a trusteeship of terrifying gravity.

We hold in trust a power that is capable of unraveling the very fabric of our civilization. Equally, it may be susceptible of development as a mighty force for human welfare. But we have proved the destructive use, while the constructive applications are still in the realm of speculation.

Clearly the trust is of a magnitude that transcends national jurisdiction. No walls have ever been built high enough to fence in the spread of scientific knowledge, and even if we were resolved to forego the harnessing of atomic power for peace, it is hopeless to think that its application for war can be held for long as the monopoly of one, or a small group of nations.

At one giant stride our scientific and technological development has so far outdistanced our social engineering, that we have no choice but to turn our full powers of creative imagination to control the forces we have unleashed and to bend them to man's use rather than to his destruction.

Since control is not possible without understanding, I have asked several of my editorial colleagues in the McGraw-Hill organization to present on the pages which follow a non-technical but authoritative account of the known facts and implications of atomic power.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Co., Inc.

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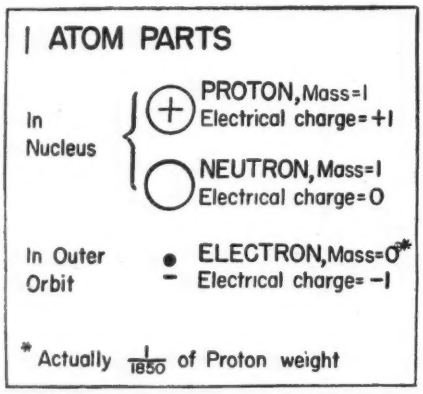
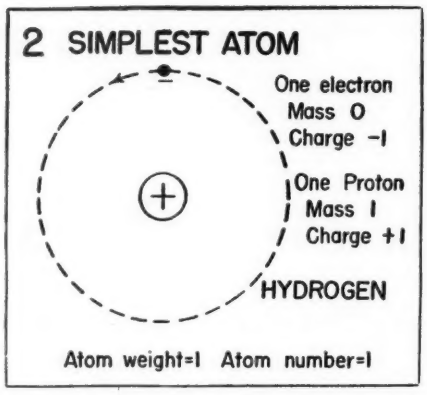
HOW ATOM SPLITTING

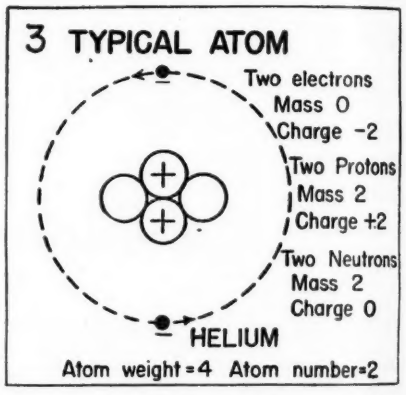
Five years ago the world learned that the atom of Uranium 235 had been split, releasing energy at the rate of about 11,400,000 kilowatt-hours per pound. The whole amount tested was less than the head of a pin, but there was no escaping the possibility that heaters, engines, turbines, jets and explosives could be powered by atomic energy. Then began the race to win the war with atoms.

With what help England could give, America outran the best atom-splitting team Germany could muster. It was all done in silence. From the summer of 1940 until the atomic bomb blasted Hiroshima, black secrecy blanketed history's most amazing scientific and industrial accomplishment.

Coldly scientific in form, the War Department's "Smyth Report," released August 12, 1945, traces

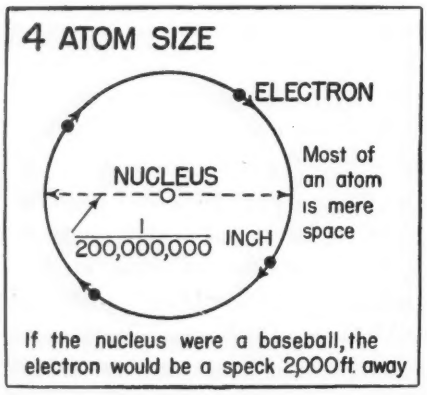


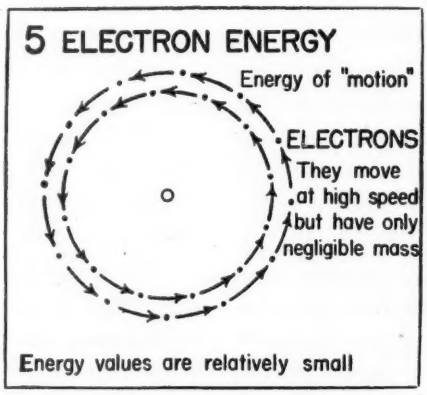


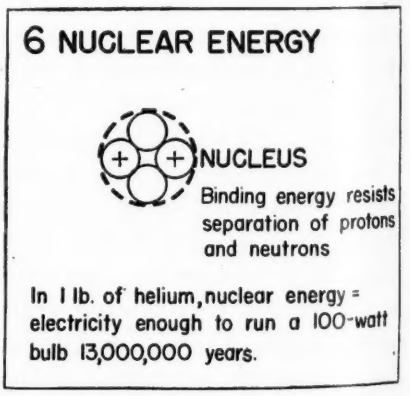


Each of the 92 elements has its own *atom*, yet all atoms are made from the same three pieces, Fig. 1: *proton* (weight 1, electric charge +1), *neutron* (weight 1, charge 0), *electron* (weight 0, charge −1).

Every atom is a tiny "solar system." Its central "sun" has one or more protons, generally neutrons too. The revolving "planets" are electrons, one for each proton in nucleus, because plus and minus must balance in the atom. The opposite charges attract, but high speed keeps the electrons out in their circular orbits, just as the centrifugal tendency of the revolving earth defies the sun's gravitational pull. All the weight of an atom is in the nucleus, so add the number of protons and neutrons to get the atom's weight. The *atomic number* is equal to the number of protons. The elements are known by their atomic numbers. Thus uranium (92 protons) is element 92.


4 ATOM SIZE
ELECTRON
NUCLEUS
Most of an atom is mere space
1/200,000,000 INCH
If the nucleus were a baseball, the electron would be a speck 2,000 ft. away


5 ELECTRON ENERGY
Energy of "motion"
ELECTRONS
They move at high speed but have only negligible mass
Energy values are relatively small


6 NUCLEAR ENERGY
NUCLEUS
Binding energy resists separation of protons and neutrons
In 1 lb. of helium, nuclear energy = electricity enough to run a 100-watt bulb 13,000,000 years.

With only their outermost orbits touching, it would take half a million atoms to span the thickness of a human hair. Yet if one could expand an atom until its outer orbits encircled 100 acres, the nucleus would be no bigger than a baseball. The atom is mostly empty space, Fig. 4, and nuclei are difficult targets; so much so that a neutron bullet fired at a mass of atoms may pass right through without a hit.

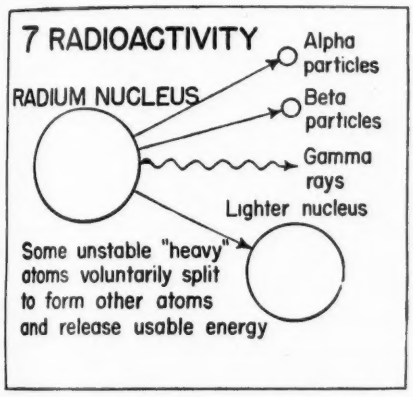
The almost weightless speeding electrons, Fig. 5, supply all the energy of chemical reactions (as when coal burns or TNT explodes). Evading all ordinary chemical action, the immensely greater energy bound up in the nucleus, Fig. 6, can be released only by direct hits on the nucleus to break the bonds that hold the protons and neutrons in a tight bundle.

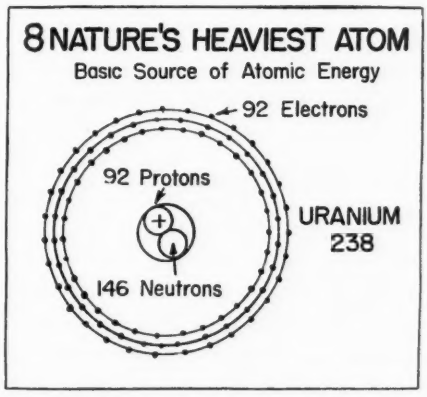
RELEASES ENERGY

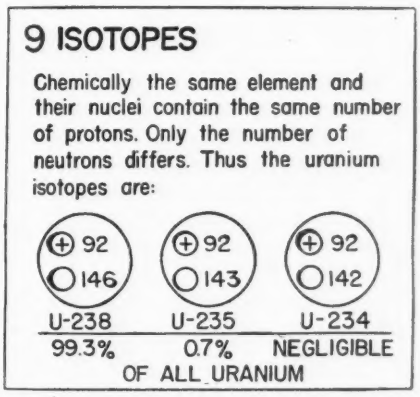
the fantastic course of atomic engineering through the five years of news blackout. It leaves no doubt that only a complete mobilization of America's technical resources could have won this victory in time.

Other writers in other places will unfold the epic story. This presentation leaves no space to reflect the glory of the accomplishment or even to record its history. The aim is more immediately practical — to give the professional and business readers of the McGraw-Hill publications a sound and honest, though non-technical, understanding of this atom-smashing business, so that they will know better what to do about it in their personal and business lives.

Now for step one: learning the shape of atoms and how atom splitting releases energy.

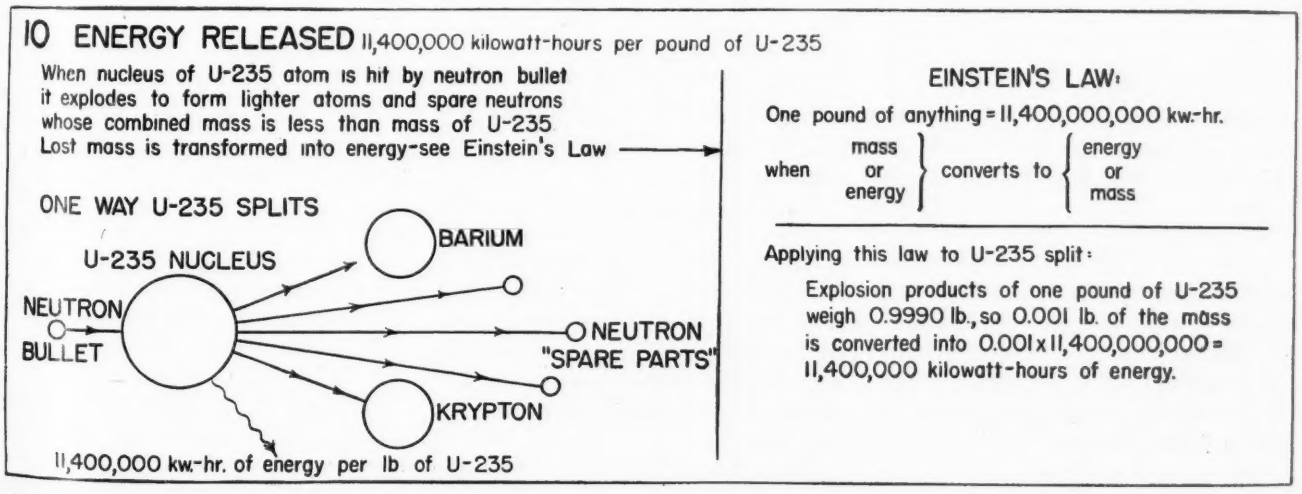






Radium nucleus, Fig. 7, automatically emits particles and energy as it decays to form nuclei of a lighter atom. Most common form of uranium, nature's heaviest atom, is Uranium 238, Fig. 8. This form is not directly useful for energy release, but is important as the raw material for a new synthetic power atom, *plutonium*.

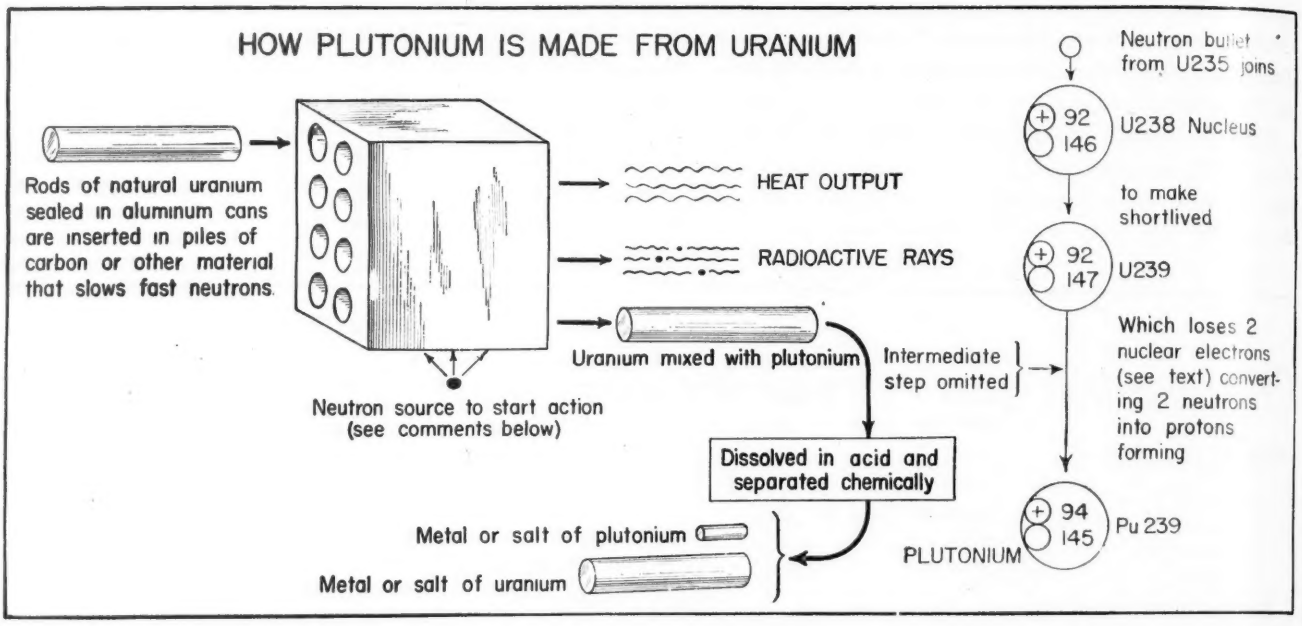
An element may have several *isotopes* — alternate forms with the same number of protons but slightly different numbers of neutrons. Uranium 238 is the isotope in which protons and neutrons total 238 (so atom weight is 238). It is 99.3% of the total weight of pure, natural uranium. The stuff needed for direct atomic-energy release is Uranium 235, only 0.7% of the total weight and very difficult to separate from 238. To put it another way, every pound of energy-giving U-235 comes mixed with a dead load of 140 pounds of relatively inert U-238.


10 ENERGY RELEASED 11,400,000 kilowatt-hours per pound of U-235
When nucleus of U-235 atom is hit by neutron bullet it explodes to form lighter atoms and spare neutrons whose combined mass is less than mass of U-235. Lost mass is transformed into energy-see Einstein's Law
ONE WAY U-235 SPLITS
U-235 NUCLEUS
NEUTRON BULLET
BARIUM
NEUTRON "SPARE PARTS"
KRYPTON
11,400,000 kw.-hr. of energy per lb of U-235
EINSTEIN'S LAW:
One pound of anything = 11,400,000,000 kw.-hr.
when mass or energy converts to energy or mass
Applying this law to U-235 split:
Explosion products of one pound of U-235 weigh 0.9990 lb., so 0.001 lb. of the mass is converted into 0.001 x 11,400,000,000 = 11,400,000 kilowatt-hours of energy.

Slow neutron bullet splits Uranium 235 nuclear target, generating two lighter atoms (Fig. 10 shows one possibility) and several free neutrons ready to split other U-235 atoms. The following pages show how the original neutron may be produced and directed and how a chain of self-propagating atomic explosions may sweep through a block of U-235 like a forest fire to release heat energy equivalent to 11,400,000 kilowatt-hours per pound. CONTINUED ON NEXT PAGE

CREATING and ISOLATING

Man-Made Plutonium—U-235 Substitute


HOW PLUTONIUM IS MADE FROM URANIUM
Rods of natural uranium sealed in aluminum cans are inserted in piles of carbon or other material that slows fast neutrons
HEAT OUTPUT
RADIOACTIVE RAYS
Uranium mixed with plutonium
Neutron source to start action (see comments below)
Intermediate step omitted
Dissolved in acid and separated chemically
Metal or salt of plutonium
Metal or salt of uranium
Neutron bullet from U235 joins
92 146 U238 Nucleus
to make shortlived
92 147 U239
Which loses 2 nuclear electrons (see text) converting 2 neutrons into protons forming
94 145 Pu 239
PLUTONIUM

We now have two kinds of atoms suitable for energy supply, Uranium 235 and the new man-made element No. 94, plutonium. Uranium, No. 92, has the heaviest atom of any natural element.

The Manhattan Project's plant, on the Columbia River at Hanford, Washington, is the world's greatest atom-making factory. Devoted entirely to the mass production of plutonium atoms, it uses U-238 as the raw material and U-235 as the energy source, intimately mixed in the same proportions as in natural uranium metal.

The production units at Hanford are several huge uranium "piles." Each is a very large block of graphite with holes in which are placed uranium-metal cylinders, sealed in aluminum cans to protect the uranium from corrosion by the cooling water constantly pumped through the pile.

Each pile runs itself, so to speak. Not even the conventionally pictured bits of radium, beryllium and paraffin are needed as a "pilot light" to start operation. There are always enough stray neutrons, or even cosmic rays, to start a chain reaction.

But once started, the design, size and control of the unit must be such that the chain reaction will continue at an even rate — neither die down nor overshoot into an explosion.

To see this picture in atomic terms, consider the fraction of a second in which one million U-235 nuclei are split, producing two million lighter atoms (say, one million of barium and one million of krypton) and between one and three million fast-moving neutron projectiles.

Some of these escape in free flight right through the relatively vast atomic "open spaces." Some are "captured" by the many U-238 nuclei, and others are captured by the impurities. But, on the average, of the one to three million, just one million neutrons must succeed in smashing another million U-235 atoms in the next fraction of a second. Thus, with reproduction rate exactly maintained, life goes on in the atomic-energy pile.

The carbon, one of several possible "moderators," serves to slow down the neutrons without capturing many. The chance of a fast, straight-moving neutron hitting a tiny nucleus is very small, whereas the "slow ball" neutron is likely to be sucked in by the nuclear attraction if it would otherwise be a near miss.

From the practical angle, maintaining a chain reaction requires careful design and good controls. The pile must be slightly larger than actually necessary for a chain reaction (that means scores of tons of material). Controls must be sensitive and dependable. They slow the pile down to the balancing point by sliding in retarders, such as strips of cadmium.

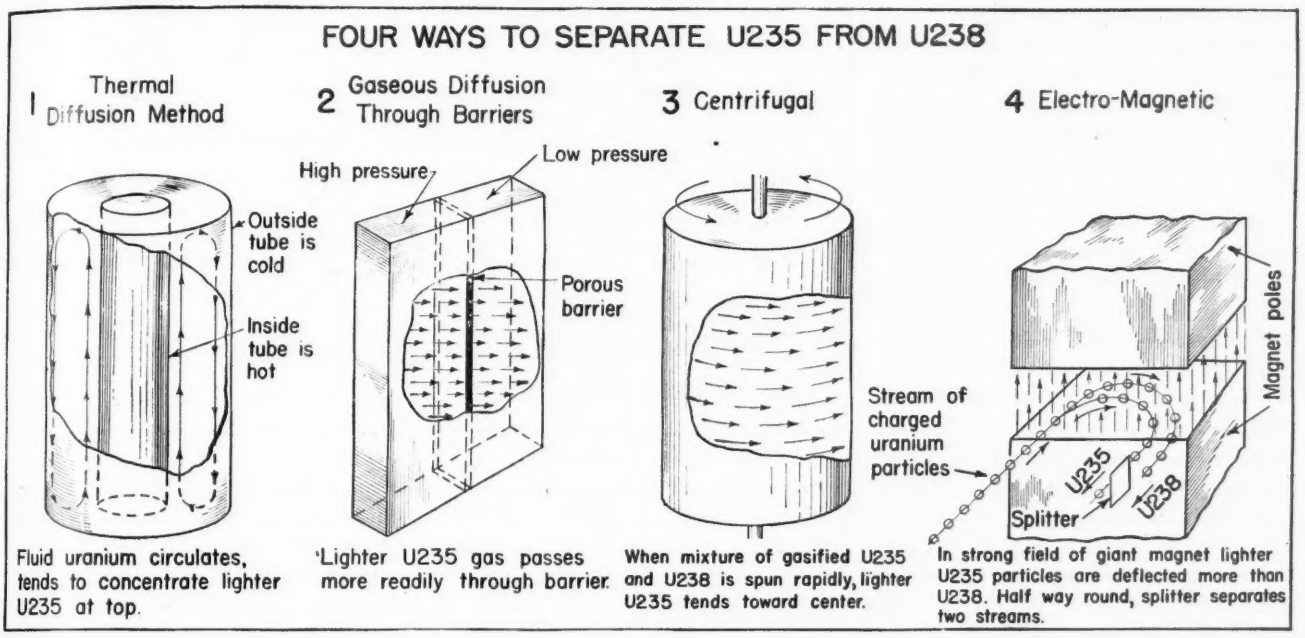
As already noted elsewhere, the energy released is about 11,400,000 kilowatt-hours for each pound of U-235 split. This energy appears first in the high speed of the pieces thrown off by the atomic split, then is converted to sensible heat as collisions slow down these projectiles. The energy is finally removed from the pile in the form of hot air, steam, hot water or other heated fluid in commercial quantity and thermal condition.

Such piles, operated with normal uranium, or with uranium enriched in U-235, would seem to be the primary means by which atomic energy will serve (if ever) as a commercial source of heat and power. Plutonium would be a byproduct, but might under certain conditions add to the energy yield of the pile without the need to separate it from the uranium.

The use of normal uranium in the Hanford pile sounds extremely attractive as a heat source, but has certain economic disabilities. Only a small part of the U-235 is used up before the pile must be shut down to remove the plutonium.

THE HIGH-POWER ATOMS

Isolating U-235 — a Gigantic Task


FOUR WAYS TO SEPARATE U235 FROM U238
1 Thermal Diffusion Method
2 Gaseous Diffusion Through Barriers
3 Centrifugal
4 Electro-Magnetic
Outside tube is cold
Inside tube is hot
High pressure
Low pressure
Porous barrier
Stream of charged uranium particles
U235
U238
Splitter
Magnet poles
Fluid uranium circulates, tends to concentrate lighter U235 at top.
Lighter U235 gas passes more readily through barrier.
When mixture of gasified U235 and U238 is spun rapidly, lighter U235 tends toward center.
In strong field of giant magnet lighter U235 particles are deflected more than U238. Half way round, splitter separates two streams.

Many of the uranium ores, including most samples of pitchblende and carnotite, will yield from 1 to 15% metallic uranium. Chemical separation of the metallic "natural" uranium is simple. Whatever the source, natural uranium contains the three isotopes in the constant proportions of 99.3% U-238 and 0.7% U-235, with traces of U-234.

Separating the U-235 from U-238, an operation essential for explosive uses of U-235, and probably important for future commercial controlled-chain piles, has been most difficult. Chemical separation was impossible because U-235 and U-238 are chemically the same.

The only possibility was a separation by physical differences, primarily a one percent difference in weight. The porous barrier and centrifugal methods pictured above required vaporizing a salt of uranium. All the methods shown have been used or tried on the Manhattan Project. All require many stages to achieve a substantial concentration of Uranium 235.

Dollarwise Thoughts on Atomic Energy

Costs mean little in war, but peacetime uses of U-235 and plutonium must pass the dollar test in competition with coal, fuel oil, natural gas, gasoline and electricity.

On the basis of energy costs only, "*all other things being equal*," the table on the last page of this section shows at what price per pound U-235 would give the same energy cost as conventional energy sources selling at the indicated prices. For such comparisons it is convenient to remember that one pound of U-235 is equal (energy-wise) to about 11,400,000 kilowatt-hours, also to 1500 tons of coal, or 200,000 gallons of gasoline.

Fuel engineers understand the limitations of such oversimplified comparisons. Others should be warned that "all other things" are never equal. With this thought in mind, reconsider the uranium piles operated at Hanford to produce plutonium. These use U-235 in the cheapest form, say about $1400 per lb., assuming purified normal uranium at $10 per lb. (140 lb. of uranium contains one pound of U-235.)

If this were the whole story, coal would have to sell for a dollar a ton to break even with U-235 as a water heater. However, the pile using normal uranium must be immense to hold its own in a chain reaction. More important, the accumulating fission products "poison" the reaction after only a small part of the U-235 has been used up. Then the uranium cylinders must be removed for plutonium recovery. Finally, it has not yet been found possible to operate the normal-uranium piles at high enough temperatures for practical power production.

If we go to the other extreme and build a small pile, using concentrated U-235, we shall run into excessive material costs, perhaps several times the $52,000 per lb. set down in the table as the equivalent of 20-cent gasoline.

Something between the two extremes is likely to prove the most economical — perhaps a pile operating on a U-235 concentration between 1 and 10%.

The engineer of the "atomic-power age" must know the price of Uranium 235 *in various concentrations* and the characteristics of piles suited to them. No such information is yet available. He must also watch the danger from radio-activity; the requirements for radiation shields; explosion hazards, etc.

CONTINUED ON NEXT PAGE

WHAT TO EXPECT

Before discussion of possible and probable future applications of atomic energy to the arts of peace, the atomic bombs should have consideration. We may assume that these bombs contained from two to 200 lb. of either U-235 or plutonium, or both. No more precise information is available.

Details of the bomb design have been completely suppressed, but the following basic considerations are stated or implied in the Smyth Report:

The explosive in a bomb must be highly concentrated U-235 or plutonium. Since slow neutrons could not produce a satisfactory explosion, the neutron retarder or *moderator*, is minimized. This, in turn, requires a U-235 mass so large that the escape of neutrons without hitting nuclei will not be excessive. For every 1000 atoms hit, the neutrons produced must split more than 1000 new atoms, so that the reaction will proceed rapidly in an expanding chain, as sketched below.

There can be little leeway in the size of the explosive charge. For a given shape there is a certain "critical" weight of material. If this is exceeded the bomb explodes instantly. If the weight of charge is less than the critical, it cannot be made to explode.

Therefore, the critical mass must be created at the moment of explosion.

The Smyth Report suggests that this can be accomplished by breaking down the charge into two or more well-separated parts, each having less than the critical mass. At the appointed moment these could be brought together within the bomb to create a supercritical mass, which would then explode automatically.

CLAIMS LIKE THESE ARE NOT JUSTIFIED

1. Pretty soon no more coal will be mined except as a raw material for chemical manufacture.

2. In a few years a tiny bit of uranium, built in at the factory, will drive your car for life through an engine no bigger than your fist.

3. All the big central stations will soon be running on atomic power.

4. Cheap atomic energy will enormously reduce the price of power.

Peacetime Applications

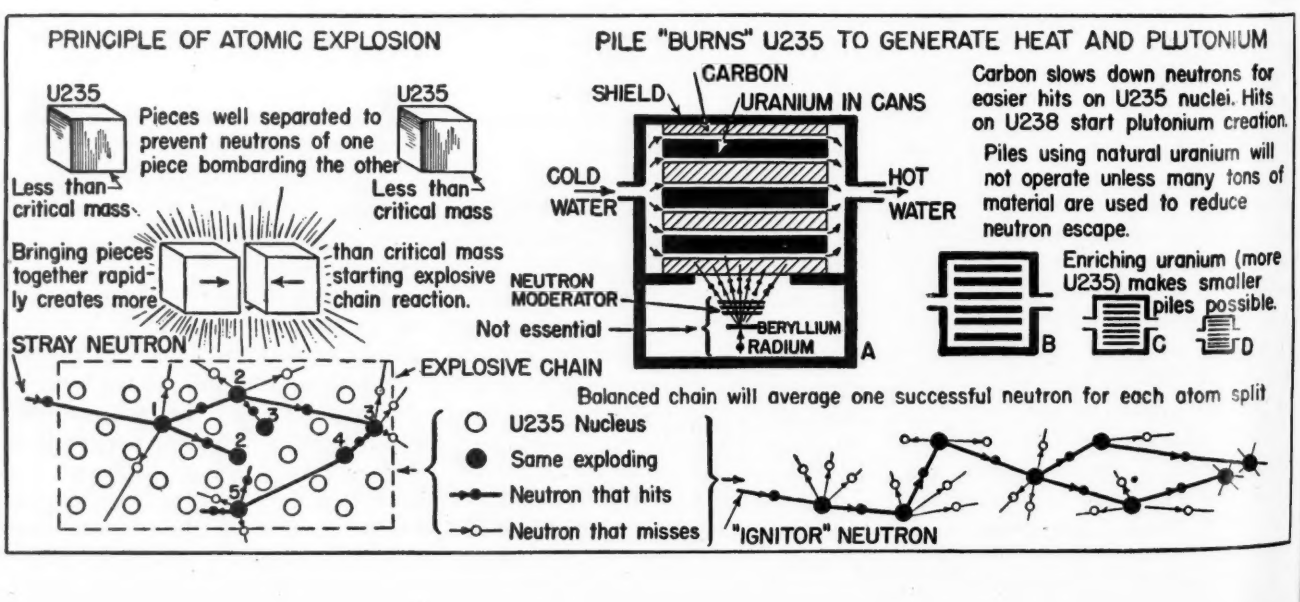
Except possibly for superblasting operations, uncontrolled explosive reactions cannot be permitted in the peacetime use of atomic energy. This means that the quantity of U-235 assembled in any one spot must always be kept well below the critical weight to avoid spontaneous explosion.

Depending on the particular application, the most desirable concentration of U-235 may range anywhere from the 0.7% in normal uranium up to 100%, with the probability that many industrial applications will find the greatest economy in concentrations between 1% and 15%.

This matter of the degree of concentration of U-235 has received little public attention, yet nothing could be of greater practical importance. To make this point clear, consider the two extremes, 0.7% of U-235 and 100% of U-235, respectively.

The Hanford pile, using normal uranium (0.7% U-235) with carbon moderator, must be very large to work at all. It is inefficient in the sense that it must be shut down after a small part of the U-235 has been consumed. It cannot operate at high temperatures.

Its great advantage as a heat producer is the fact that its U-235 is bought at the lowest possible price. If


PRINCIPLE OF ATOMIC EXPLOSION
U235
U235
Pieces well separated to prevent neutrons of one piece bombarding the other
Less than critical mass
Less than critical mass
Bringing pieces together rapidly creates more than critical mass starting explosive chain reaction.
STRAY NEUTRON
EXPLOSIVE CHAIN
PILE "BURNS" U235 TO GENERATE HEAT AND PLUTONIUM
SHIELD
CARBON
URANIUM IN CANS
COLD WATER
HOT WATER
NEUTRON MODERATOR
Not essential
BERYLLIUM
RADIUM
A
Carbon slows down neutrons for easier hits on U235 nuclei. Hits on U238 start plutonium creation.
Piles using natural uranium will not operate unless many tons of material are used to reduce neutron escape.
Enriching uranium (more U235) makes smaller piles possible.
B
C
D
Balanced chain will average one successful neutron for each atom split
U235 Nucleus
Same exploding
Neutron that hits
Neutron that misses
"IGNITOR" NEUTRON

FROM ATOMIC ENERGY

. . . BUT REMEMBER THESE FACTS

1. The large-scale, controlled release of heat energy from U-235 has been fully demonstrated.

2. Beyond question, this energy could be applied directly for heating water and air, and making steam.

3. Such heat, in turn, could be applied directly, or converted into mechanical power or electricity by conventional steam turbines and gas turbines.

4. If and when U-235 in concentrations up to 10% costs less than $25,000 per lb., it may find applications, but will compete, at first, with premium fuels rather than coal.

purified normal uranium sells for, say, $10.00 per lb., the price of 140 lb. (containing one lb. of U-235) will be only $1400. This would be a very favorable price if the pile could operate efficiently with the 0.7% U-235.

Concentrating the U-235 to 100% would permit a much more compact and convenient pile — perhaps little more than small pieces of U-235, encased in aluminum to ward off corrosion, and immersed in a tank of water; this should convert the water into steam at a regulated rate.

In large part, the control would be inherent. The water as a moderator would keep the chain going, but if the reaction got too violent, the resulting higher superheating of the steam would decrease the moderator effect and thereby hold the reaction in check. Yet even if all this comes true the cost of concentrated U-235 in the near future will be many times $10,000 per lb.

Running up the concentration only a few percent above that in normal uranium may prove to be the way to get reasonable pile size and good efficiency without incurring exorbitant concentration costs.

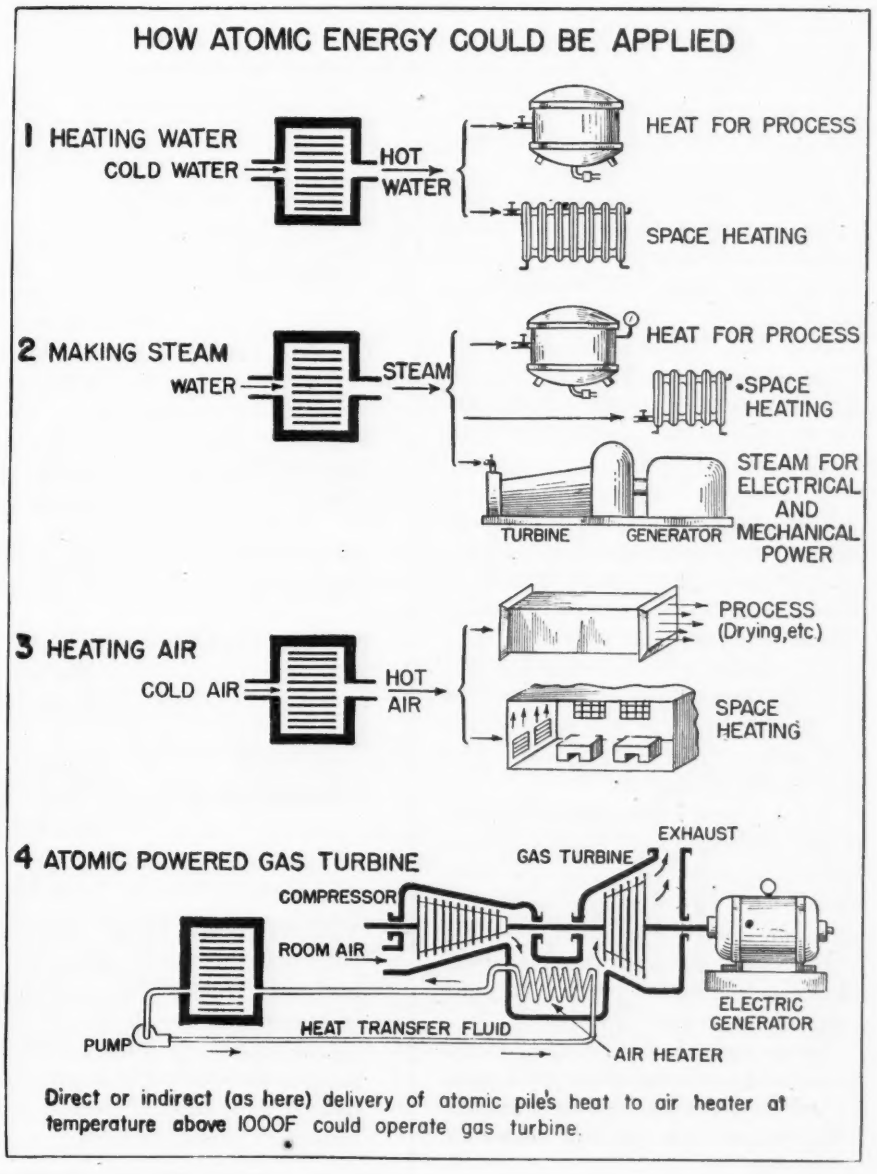
When atomic energy is applied, the starting point is heat, picked up by water, air or a special heat-transfer fluid. Intermediate heat transfer fluids may be essential in certain applications (space heating and service water, for example) where people must be protected from injury by radioactivity.

The intermediate heat-transfer fluid shown for the gas turbine would, of course, have to operate at temperatures up to 1200 F. There seems to be no basic reason why the pile itself could not be built inside the compressed-air receiver, discharging its heat directly to the compressed air.

With rather high concentration of U-235, this arrangement might be suitable for large airplane drive if excessive weight of radiation shields could be avoided.

Also, presumably, rockets and planes of the "buzzbomb" type could be powered by atomic heat delivered to the air of the jet steadily, not in puffs.

The sketches stress direct applica-



Direct or indirect (as here) delivery of atomic pile's heat to air heater at temperature above 1000F could operate gas turbine.

THESE THINGS MIGHT RESTRICT USE OF ATOMIC ENERGY

1. Ineffectiveness of large piles using normal U-235 concentration

2. High cost of concentrated U-235 for smaller, more effective piles

3. Danger from radioactivity

4. Weight and cost of shielding against radiation

5. Explosion hazard

6. Possible short supply of uranium

7. Governmental restrictions on atomic-energy materials

tions of hot air, steam and hot water to process and space heating. This emphasis is justified by the often overlooked fact that such applications of heat have many times the total energy value of all the electricity generated in the United States for all purposes.

There has been much popular speculation regarding the type of engines required for atomic-power generation. The answer is simple. Present engines, steam turbines and gas turbines can be used with little or no change. This, of course, does not rule out the possible discovery of specialized engines for atomic power, or even direct production of electricity from atomic energy.

In the long run the implications of atomic power are staggering for both war and peace. However, popular writers on the subject have undoubtedly created unreasonable hopes in the minds of readers — for example, the expectation that in two or three years the Detroit builders will market cars with built-in "lifetime" slugs of U-235 and "fist-sized" engines.

Yet it seems fairly safe to predict that atomic energy will find some commercial applications within the next five or ten years, first, probably, as a premium fuel like aviation gasoline, worth a fancy price for specialized applications where low weight or some other characteristic is important.

As the cost of concentrating U-235 is reduced and application efficiencies improved, atomic energy may compete with cheaper fuels, perhaps ultimately with coal.

Important non-power applications of atomic energy may well include the ultra-high-temperature processing and fabricating of materials — also, modern "alchemy": building and rebuilding atoms to create new elements and to produce old elements at lower costs.

Radioactivity obtained directly or indirectly from artificial atom-splitting should find many important medical and industrial applications.

Turning back to ordinary power applications, we must avoid the temptation to overstress the economic importance of lower-cost power fuel. Fuel cost is only about 17% of the gross receipts of the electric utilities. Here's another way to put it: If, after allowing for transmission losses, one kilowatt-hour delivered to the consumer from modern plants represents a coal consumption of 1.5 lb., and if the coal costs $5.00 per ton cancellation of the coal bill could not save more than 3/8 of a cent per killowatt-hour. And atomic fuel will certainly not be free.

Performance of the atomic bomb is a monument to the scientists who unlocked the secrets of the atom and suggested the basic technique of making plutonium and concentrating U-235.

From there on, the job was at least 50% engineering. The various big plants of the Manhattan Project are vast assemblages of pipes, tanks, boilers, valves, instruments and controls, installed and operated by engineers, largely designed by engineers. From now on, the speed with which atomic power becomes practical will depend on the effectiveness of the engineer-scientist team.

It is possible, of course, that national controls may completely upset the entire technical and economic pattern of this discussion. For reasons of national security the government may decide to control or restrict atomic-power materials, plants and operations in ways not yet determined.

U-235 COULD COMPETE AT THESE PRICES
other things being equal

Common fuel	*Assumed prices*	*Comparable prices for Uranium 235, dollars per pound (nearest thousand)*
COAL (13,000 B.t.u.)	$6 per ton	$9,000
	$12 per ton	$18,000
	$15 per ton	$23,000
FUEL OIL (150,000 B.t.u. gal.)	2¢ per gal.	$5,000
	4¢ per gal.	$10,000
	8¢ per gal.	$20,000
CITY GAS (500 B.t.u.)	50¢ per 1000 cu. ft.	$39,000
	$1 per 1000 cu. ft.	$78,000
NATURAL GAS (1000 B.t.u.)	25¢ per 1000 cu. ft.	$10,000
	50¢ per 1000 cu. ft.	$20,000
	$1 per 1000 cu. ft.	$40,000
GASOLINE (150,000 B.t.u. gal.)	10¢ per gal.	$26,000
	20¢ per gal.	$52,000
	30¢ per gal.	$78,000

BUT

Note that "other things" are never equal. U-235 in normal uranium form is by far the cheapest, but involves use of excessively large and inefficient "piles." The unit cost of the U-235 in enriched mixtures increases with the degree of enrichment. Over-all cost comparisons can be made only for a specified concentration of U-235 and for apparatus suitable for that particular concentration. Possible explosion danger and need to protect personnel against radiation are other important considerations.

LABOR *and* MANAGEMENT MEET— *for* PEACE *or* CIVIL WAR?

THE prospect of a knock-down and drag-out fight in the automobile industry does not augur well for the reconversion outlook, which upon every other score is bright. Any widespread outbreak of the type of industrial warfare which now threatens will disrupt, more thoroughly than anything else on the horizon, an orderly transition to a peacetime economy.

It is doubly unfortunate that there should be a general tightening of union and company battle lines upon the eve of the Labor-Management Conference, which on November 5th will convene at President Truman's direction for the purpose of "working out by agreement means to minimize labor disputes." If the current work stoppages occasioned by industrial conflicts should increase rather than diminish between now and November first, the Conference atmosphere hardly promises to be favorable to a dispassionate examination of basic issues.

Yet the shadow of the threatened industrial storm that hangs over the Conference only serves to emphasize the importance of reaching satisfactory agreement upon two problems with which such a Conference might deal. The first is that of determining what machinery shall be used for settling disputes upon which employers and workers have reached an impasse. The second, and more far-reaching, is that of arriving at some common understanding upon the major issues which commonly lead to irreconcilable disputes.

Settlement of Wartime Disputes by the War Labor Board

During the war the first problem was handled largely by machinery centered in the National War Labor Board. Supported by general adherence to patriotic pledges by labor leaders and employers not to resort to the use of economic force against each other during wartime, and backed up on rare occasion by use of the President's power to seize plants for war purposes when its orders were not obeyed, the Board managed, by what amounted to compulsory arbitration, to settle the nation's wartime labor disputes with relatively little economic loss.

But it can scarcely be claimed that the War Labor Board did much to resolve the issues from which disputes grow. Indeed, the fact that it was available to issue orders in cases which the Secretary of Labor certified as likely to "lead to substantial interference with the war effort", resulted in the conversion into full fledged disputes of many disagreements which would otherwise have been settled at a local level in the course of collective bargaining. Meanwhile, local collective bargaining machinery which should have been doing most of this work was neglected, and will need thorough reconditioning even to be brought back to its prewar level of effectiveness.

With V-J Day came an abrupt change in the status of the War Labor Board. One of its main props, labor's "no strike pledge", was promptly withdrawn. It could no longer rely on the President to use his power to seize plants for war purposes to force obedience to its orders. Consequently the Board agreed that it would accept new cases only if both parties to the dispute stipulated in advance that they would abide by the Board's findings, that it would clear its dockets of old cases as rapidly as possible, and that it would then go out of business, leaving to the Labor-Management Conference the question of what should take its place in the postwar period.

What Shall Take the War Labor Board's Place?

The immediate and pressing task of the Labor-Management Conference is to agree upon machinery for settling industrial disputes in the peacetime economy.

Neither management nor labor wants the continuation of compulsory arbitration to which they submitted as a necessary war measure. But it must be clear to everyone that if any substantial proportion of the disputes that inevitably arise are settled by resort to strikes and lockouts, economic anarchy will result. Not only will it be impossible to achieve the high levels of output and employment that have been set as postwar goals, but it is questionable whether our economy could survive. The only alternative to compulsory arbitration under government auspices is for management and labor to demonstrate their ability to effect a peaceable resolution of their differences without it.

The most obvious need is to set up local machinery at the grass roots where disputes originate. That is where most of them should be settled by local negotiation and, when that fails, through voluntary submission to mediation or arbitration under terms of reference to which the parties agree. Many issues, which at plant level are relatively simple in character, are blown up to formidable dimension and complexity when they are passed along

the line for decision in Washington. The centralizing process is one that frightens everyone connected with it because it focuses attention upon the possible importance of precedents established by a decision, rather than upon resolving satisfactorily the particular dispute at hand.

Unquestionably, some Federal machinery must be provided which may be called upon in cases where the size or implications of a threatened dispute clearly run beyond local jurisdiction. That will mean the thorough revamping of conciliation and mediation machinery which exists, but which has grown rusty through disuse while compulsory arbitration was the order of the day.

At least, this involves a complete overhauling of the United States Conciliation Service with a noteworthy strengthening of its personnel. There may be wisdom also in recently advanced suggestions for the creation of a board of arbitration to act in cases voluntarily submitted by the parties concerned, and for boards of inquiry to make reports upon the merits of disputes in which the public interest is concerned. But there is valid ground for questioning what appears to be the common assumption that such machinery should be located in the Department of Labor. It belongs neither there nor in the Department of Commerce. For the work which such agencies are called upon to perform, both the appearance and fact of complete impartiality are essential to effective performance. Assurance of impartiality will not be fostered by placing them in a department specifically charged by Congress with the task of advancing the interests of wage workers.

Resolving the Issues Over Which Disputes Arise

It may be, as many think, that the forthcoming Labor-Management Conference cannot effectively handle any problems beyond the procedural ones suggested above. If that is true, its agenda probably should be restricted to planning the reconstitution of collective-bargaining and dispute-settlement machinery, in view of the urgent need for putting it in working order.

But either in this Conference, or in subsequent ones, there will have to be an attempt to reach a reasonable measure of labor-management accord upon certain basic issues over which most industrial disputes originate. The best of machinery can be swamped if disputes are generated in ever-increasing number.

Most important of such issues is that of the fair determination of wages. There is clear need for reaching agreements at least upon the major factors on which such determination should rest. It seems evident that if we are ever to hope to reach the high levels set and generally accepted as postwar goals, we must harness economic incentives to promote production efficiency. That means that workers, as well as management, must be given a genuine stake in increased productivity. No universal formula is possible, but we should be able to agree upon general principles for dividing returns derived from improved performance in output between workers and investors, and consumers in the form of lowered prices.

Again, since unionism is here to stay, general acceptance by management of the principle of collective bargaining would save innumerable disputes which are concerned more with the method of negotiation than with the concession sought. Few in management still question the validity of the collective bargaining process as such, but there are many matters to be resolved of which the question of the open shop, the union shop, or the closed shop is merely a conspicuous example, upon which there is wide divergence of conviction between and within labor and management groups.

On the management side, there is sincere concern about the intent or ability of union leaders to exercise responsible control that assures compliance with contractural obligations. Wild-cat strikes are of sufficiently frequent occurrence to give substance to this distrust, and union discipline seldom has been administered in a decisive or effective fashion. The prospective rivalry of three competing labor organizations of national scope gives management little confidence that a bargain made and kept in good faith with any one of them provides assurance against work stoppages.

All of these matters, and many others, need thrashing out between management and labor, with the view of arriving at as large a measure of specific and detailed agreement as can be achieved. The greater the area of such agreement, the smaller will be the area for disputes that must be handled by settlement machinery, or put to the final test of force.

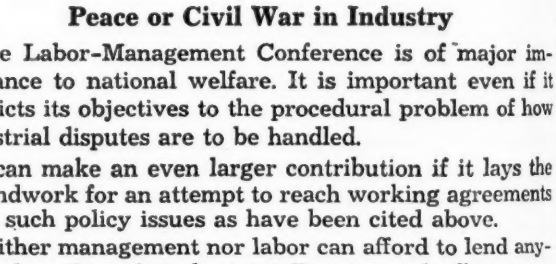
Peace or Civil War in Industry

The Labor-Management Conference is of major importance to national welfare. It is important even if it restricts its objectives to the procedural problem of how industrial disputes are to be handled.

It can make an even larger contribution if it lays the groundwork for an attempt to reach working agreements upon such policy issues as have been cited above.

Neither management nor labor can afford to lend anything less than their best intelligence and effort to an attempt to arrive at common understanding. Success will mean that we have a genuine chance of reaching new levels of economic well-being. Failure will mean industrial civil war, in which the casualties will be high. One almost certain casualty of such a war will be the principle of collective bargaining, since the Government can scarcely refrain from establishing compulsory arbitration if sufficient breakdown occurs.

It is to the vital interest of both management and labor to demonstrate that they can responsibly control themselves.



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THIS IS THE 40TH OF A SERIES

THE GERMAN ECONOMIC PEACE HARD, SOFT... or WORKABLE?

IT is not surprising that difficulties are being encountered in spelling out the detailed terms of the German economic settlement.

The problem is exceedingly complex. The German economy is more or less inextricably bound up with the economy of continental Europe. Before the war that area—excluding the United Kingdom, Ireland and Russia—accounted for approximately one-fourth of the world's production, and for more than thirty-five per cent of world import and export trade. Germany's production constituted almost one-third of the output of continental Europe. It is obvious that the decisions we make now concerning the future German economy will exert profound influence not only upon the economy of Europe but also upon that of the world. It is clearly not practicable to plan for an expanding world economy unless provision is made for Europe generally to share in the development.

Despite the magnitude and complexity of the problems involved, it is crucial that we and our Allies come to swift and decisive agreement. Such agreement is important both to world economic reconstruction, and as a demonstration that those who won the war can reach accord on the terms of world economic rehabilitation.

We shall accomplish little if we continue to debate in terms of *adjectives*. Yet most of the public discussion to date has centered around whether or not the economic settlement with Germany should be *hard* or *soft*. To make progress we must focus instead upon *objectives*. A good program is one that will promote our objectives—a bad program is one that will not.

What Are We Trying To Accomplish?

Upon the economic objectives of the German peace settlement there is little fundamental debate. This is demonstrated by reference to a number of documents of recent release—the United States Directive to General Eisenhower of April 1945, the Report of the Tripartite Conference at Berlin of July, the Report of the American Advisors to the Office of Military Government of September. The latter document stresses fundamental difficulties in developing a practical program for carrying out the objectives of the other two, but it does not question their formulation of aims.

What are the objectives that we are seeking to forward:

1. The disarmament of Germany.

2. The elimination of German industries devoted primarily to armament production.

3. The assessment of reparations to compensate those nations which have suffered losses from German aggression through direct war destruction and through the German policy of confiscating industrial equipment to her own use.

How Far Are We Agreed on Procedure?

There is also a wide measure of agreement upon detailed procedure for carrying out these objectives. No one, of course, questions the policy of confiscating German arms. Equally, there is agreement that German industry devoted directly to the production of war equipment should be confiscated or destroyed, and that control measures should be instituted and sustained to prevent her from reconstituting such industries in the future. Since it is not practicable to prevent aircraft production and shipbuilding from being diverted to military use, these industries are included in the armament category. And similar reasoning generally extends the list of prohibited industries to ball bearings and abrasives.

There is an additional category of German production which all of the Allied powers agree should be uprooted and permanently barred. It embraces all economic activity which prewar Germany cultivated on an uneconomic basis through subsidy and other protection for the prime purpose of developing a self-sustaining economy to support aggressive war.

The major elements in this category are not difficult to define. A great German industry for the synthetic production of gasoline and other oil products from coal never operated upon an economic basis. The cost of such fuel products to prewar Germany averaged almost four times what it would have cost her to buy petroleum products in the world market. It is doubtful whether these plants could be operated postwar at a cost much below three times the world market price for competing petroleum products.

A similar situation applies to German synthetic rubber production. In an attempt to free herself at least partially from dependence upon supply lines, she produced synthetic rubber at a cost at least double the world market purchase price. Similarly, she protected or otherwise subsidized a considerable agricultural production, particularly in grains, for which her lands were so ill suited that Germans had to pay for German-grown wheat from three to four times the world market price.

These are merely outstanding examples. The maintenance of such activities in Germany constituted a drain upon the German economy rather than an advantage other than that of preserving a self-sufficiency necessary for war. Hence their elimination is clearly indicated, and generally subscribed to, though the job of defining a complete list is far from easy.

What Is The Area of Dispute?

Unfortunately, this total catalogue of agreed-upon measures is not sufficient to provide either adequate security against a resurgence of German militarism or satisfactory restitution to her European neighbors for Germany's ruthless destruction of their industrial plant and equipment. To serve these two ends it is necessary to cut down the margin of German dominance in heavy industry—in steel, in electric power, in machine tools, and other industrial equipment. Unless such steps are taken, Germany will emerge from the war with sufficient industrial power to provide a continuing and perhaps uncontrollable military threat; and we should be perpetuating a dominance that was developed, as a matter of German strategy, far beyond the requirements of her civilian domestic markets or the export potentials of normal trade.

German steel capacity was built to a wartime peak of twenty-four million tons a year. Before the war she had accumulated a store of machine tools greater than that of the United States, and her present stock of some four or five million tons of such tools is second only to ours. There is little debate over the necessity and justice of cutting down the margin of German dominance in heavy industry, particularly since it was built to its current levels through aggressive economic warfare to serve as an instrument of actual warfare. It is recognized, too, that in this sector of the German economy will be found the most useful reparations in kind for the countries damaged by German aggression.

The question is how much heavy industry and electric power equipment should be taken from Germany and transferred to others. The Russians, having experienced colossal war damage, are demanding very severe assessments. They talk of reducing postwar German steel capacity to three million tons annually.

The United States inclines to assessments in this field of less extreme dimension—we have suggested leaving in Germany an annual steel capacity of from seven to ten million tons. We naturally are concerned lest action be taken that will cause a complete breakdown of the German economy. If this should happen while we maintain occupational forces there, we should feel responsible for seeing that the Germans within our jurisdiction are provided with at least the means for subsistence. Furthermore, both we and the British know that in the long run our peoples will not support control measures over Germany which go beyond our concepts of reasonable fairness consistent with security requirements.

It is no part of our intention, as has been suggested by some, to provide for a German economy that will serve as a buffer against Russian expansion. We know, however, that our weakest course would be to commit ourselves now to continuing control measures which our people would later repudiate as falling outside democratic concepts of justice. On this issue we cannot, and should not, compromise.

How Can We Resolve Our Differences?

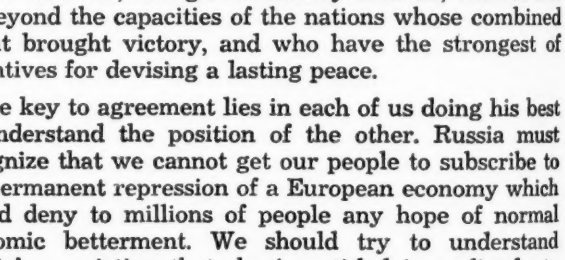
The best chance for resolving the differences which have appeared between the Russian position on the one hand and the American and the British position on the other lies in making a sharper distinction than has appeared in current discussion between long-term and short-term control decisions. All of us are agreed upon the policy of wiping out German military production and that part of German economic activity which has been run at economic loss to provide for a national self-sufficiency useful only for war purposes. But we are unwilling to enter into long-term commitments for holding down those parts of the German economy that do not constitute a war threat. That would unduly penalize future generations of Germans and drag down the whole economy of continental Europe.

It should be possible to reach agreement that measures for cutting down German heavy industries and power-generating facilities are immediate measures, and that no attempt will be made to sustain such controls over an extended period. If part of the German establishment in these fields is transferred to countries whose manufacturing resources have been damaged by German aggression, it can serve the purpose of effecting a reasonable balance without destroying utterly incentives for a new generation of Germans to improve by peaceful methods their status in a peacetime world.

Such a program is consistent with the concept of building a healthy and balanced European economy in which general economic interdependence provides one of the essential safeguards against a resurgence of German militarism. We must still face the problem of agreeing upon how far the non-armament segments of German industry can be cut back at the present juncture without leading to disastrous breakdown with its resultant chaos. Such definition, though formidably difficult, should not be beyond the capacities of the nations whose combined might brought victory, and who have the strongest of incentives for devising a lasting peace.

The key to agreement lies in each of us doing his best to understand the position of the other. Russia must recognize that we cannot get our people to subscribe to the permanent repression of a European economy which would deny to millions of people any hope of normal economic betterment. We should try to understand Russia's conviction that she is entitled immediately to reimburse herself for her war losses by drawing upon the German industrial establishment that still exists. It will help to resolve our differences if we separate in our thinking steps that require permanent controls from those which are merely temporary expedients.

Neither of us will be forwarding our ultimate and common objectives if we impose controls that blight the development of so large and important a segment of the world as continental Europe. In such a blight lies the germ of a Third World War.



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CONTROLLED ATOMS or CONTROLLED LIVES

SINCE August 6th when the first atomic bomb was released over Hiroshima, the American people have been subjected to a continuous barrage of pronouncements on the use and control of atomic energy. Some of this comment has been strident, and much of it conflicting. A considerable portion of it has been of sincere and constructive excellence.

It has not been easy to separate the wise counsel from the merely noisy, and it is small wonder that the minds of many are troubled and confused.

However, the sheer mass of discussion poured into press and microphone has awakened us all to the gravity of the issue. In terms of any problem on which Americans ever have been called to exercise a judgment—This is It!

Even the dullest now recognizes that atomic weapons hang over modern civilization like the Sword of Damocles, and understands in some measure how fragile and taut is the hair of political balance that holds it suspended.

From this point on, we need the coolest and most carefully considered judgment that can be brought to bear. Discussion highly charged with emotionalism will but increase the tensions both at home and abroad, and render wholly insoluble a delicately intricate problem.

What Is The Problem?

The major outlines of that problem now are coming into focus in understandable terms:

1. The scientists have opened up a new and virtually unlimited storehouse of energy, and the engineers have discovered how to turn it into a military explosive incomparably more powerful than any we have known. We know that this energy may also be used to produce heat for useful power, and we suspect that the radioactive substances produced by the process in hitherto unimagined quantity may also have medical, industrial, and other constructive applications.

2. Terrifying as have been the demonstrations of the atomic bomb thus far, we know that they are as nothing in comparison with its potential destructiveness. The explosive force of individual bombs can be increased tremendously, and means for their effective delivery to predetermined targets in wholesale quantity already are at hand. The experts tell us that no practicable means of interception can be devised, and that reprisal in kind probably will be the only answer to an enemy attack with atomic weapons.

3. So far as we can see now, even successful retaliation would be at best an answer of hollow effect. Any two nations each having wholesale stock-piles of bombs could accomplish the practical destruction of each other. Since a first treacherous blow might well constitute an enormous advantage, a nation actuated by a ruthless urge to conquest or revenge might have the best chance of survival. But since the widest possible dispersal of bombs and launching units would be dictated by the strategy of atomic weapons, it is doubtful that one nation could destroy another without itself suffering destruction. On both sides the major centers of population could be wiped out, and the nation of least concentrated industrialization and commerce would suffer least. However, no one can be sure that the concentrated explosion of as many as 20 thousand atomic bombs would not poison the atmosphere of the world to an extent that would be fatal to great masses of population, not only within the country bombarded, but perhaps in the country which launched them.

4. The problem is further complicated because, so far as we know now, any large-scale commercial use of atomic energy as a power source is more or less inextricably linked to a potential military use. It is true that, if atomic power becomes economically feasible (which is by no means certain for a long time to come), it would require only low-grade concentrates of fissionable material, which would need further elaborate and costly processing before reaching explosive potential. But the process of producing such low-grade concentrates constitutes perhaps two-thirds of the industrial effort required to make effective bombs. It follows, then, that if nations were to equip themselves to produce large quantities of low-grade concentrates for power generation, the effort required to develop large-scale bomb production would be materially reduced. Moreover, the maintenance of an effective inspection to police agreements not to produce bombs might be forbiddingly difficult if atomic power generation were allowed.

5. In addition to the major problem posed by the use of atomic bombs in international war, any nation which produces or possesses such bombs, or the fissionable materials with which they are loaded, faces still another in the danger of their falling under the control of paranoid elements in its own population.

What Are We Going To Do About It?

We face the hard fact that we have produced a weapon capable of destroying whole nations—perhaps even the whole world. Although we were importantly aided in its development by the nationals of other countries, we, together with Great Britain and Canada, now must take the initiative in deciding what shall be done with it. We have only two choices. We can try to keep this weapon as a monopoly of our own, or we can try to place it under broad international control.

Can We Keep It To Ourselves?

If we know one certain fact about the atomic bomb, it is that it cannot long be held as a monopoly of those nations which produced it.

If Nazi Germany had succeeded in developing the weapon first, it probably would have attempted to achieve world dominion, with utter destruction as an alternative. Such a course is not within our range of choice. It violates every principle for which we stand.

Much reckless nonsense has been uttered concerning the inability of other nations to master the scientific, engineering, and industrial problems involved. It is the virtually unanimous opinion of those who worked on the project that several nations today are fully equipped in science, engineering, and industrial organization to produce atomic bombs and to provide the means for launching them. At least one of these nations, Russia, has also access to an ample supply of the necessary raw materials. The only debate is over whether it would take three, or five, or ten years for her to marshal her resources to produce bombs in multiple thousands. Once such an atomic race were on, we have no reason to believe that Russia might not divert more resources to the task than we ourselves should be willing to put into it.

Additional nonsense is talked as to how we might attempt to cope with the problem of living in a world in which mutually suspicious or hostile nations faced each other, with stores of atomic weapons on both sides. We hear talk of dispersing our cities and even of moving underground. No one has seriously reckoned the difficulty or the cost of following such counsel of despair. Still less has anyone appraised the neurotic effect upon men's minds of living by any such preposterous formula, under continuously mounting tension day after day, and year after year.

Certainly, if we could find no way to prevent the competitive production of atomic weapons, we should be driven at least to the selective dispersion of our bomb-launching facilities, of certain key industrial establishments, and of our centers of government and governing personnel. We should be forced, also, to change our traditional requirement that only Congress can commit us to active war. We should be forced to organize ourselves as a police or military state, with our scientists regimented and muzzled, with all of us under constant surveillance against the smuggling and planting of time-bombs, and constantly alerted against attack through the air.

Before we commit ourselves to any such intolerable procedure, we should be mad not to explore all possible means for making it unnecessary.

The Only Feasible Alternative Is Effective International Control

This cardinal principle has been recognized in the statement of November 15th, issued jointly by President Truman, and Prime Ministers Attlee and King. Their statement frankly concedes that against atomic weapons there can be no adequate military defense, that no nation can command a monopoly of such weapons, that responsibility for eliminating atomic energy as an instrument of war and for devising safeguards over its use for the advancement of science and other peaceful and humanitarian ends rests upon the civilized nations of the world.

They propose that a commission be set up at once under the United Nations Organization to make recommendations: (a) for extending between all nations the exchange of basic scientific information for peaceful ends, (b) for control of atomic energy to the extent necessary to ensure its use only for peaceful purposes, (c) for the elimination from national armaments of atomic weapons and of all other major weapons adaptable to mass destruction, and (d) for effective safeguards by way of inspection and other means to protect complying states against the hazards of violations and evasions.

Already criticism is leveled at the wording of the statement, at alleged omissions, at the wisdom of choosing the United Nations Organization as the medium through which to seek agreement in view of the weaknesses of the UNO Charter.

None of these issues should be crucially important. What matters is that an invitation has been issued in good faith for the nations of the world to meet and decide upon means for assuring the elimination of weapons, the existence of which no one can afford to tolerate.

The decision cannot be other than international; it will require the best thought of the best brains the world can muster. The smaller nations have an equal stake with the large, and from them may well come the most fruitful suggestions. But Russia now holds the key to the success or failure of our proposal. If she accepts our invitation, no other nation will refuse.

Alternatively, there will be an international armament race paced by atomic weapons. It will mean an end of free science, a severe policing and regimentation of international travel and trade, and innumerable restrictions upon those individual freedoms which we have just fought so desperately to preserve. This is the dismal prospect if we fail to arrive at a genuinely international accord on the control of atomic energy. But even this interval would promise to last only for an uneasy period, until someone started pressing the push-buttons on the panel-boards of extinction.

The only permanent solution lies in finding means to eliminate war itself. That we cannot hope to achieve overnight, but we can, and do hope that the nations will now agree to eliminate atomic weapons and their radioactive by-products as instruments of war.

If they do that, we can move forward more surely to the constructive development of the incalculably valuable resources that science has newly opened to our use. And, we can hope also for a progressive improvement in international understanding.

Unless the nations can reach agreement on this paramount issue of atomic energy, it is difficult to conceive of any vital issue on which they might agree.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Co., Inc.

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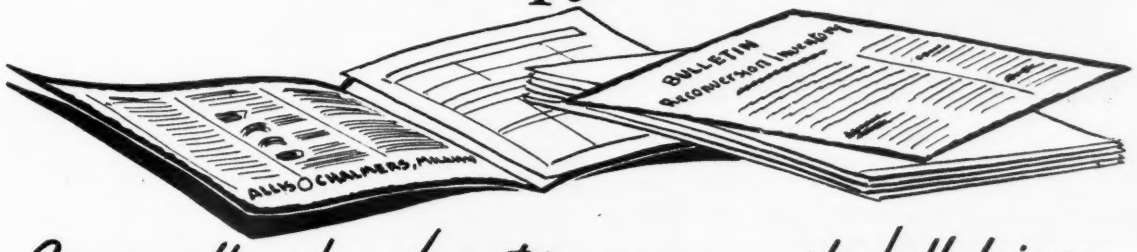

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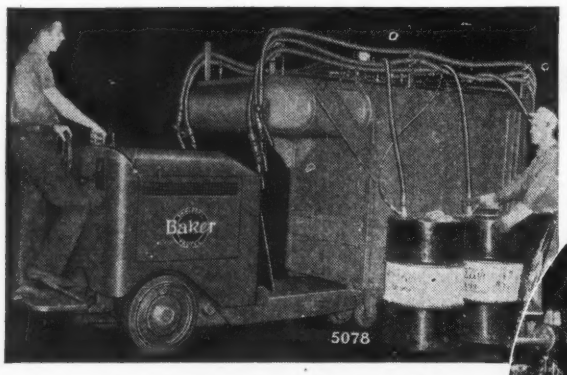
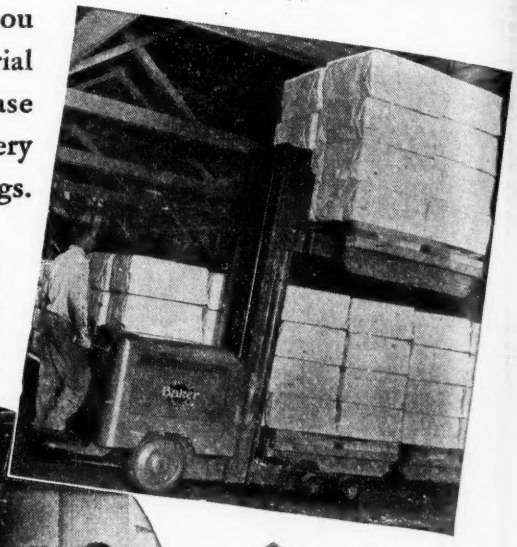
ARE *BAKER TRUCKS* MAKING SAVINGS FOR YOUR COMPETITORS—THAT YOU ARE MISSING?

In the days of keen competition just ahead, are you prepared with the most efficient, cost-reducing material handling equipment? Look over these actual case histories. There are many more of them. In fact, every Baker truck sold quickly pays for itself out of savings.



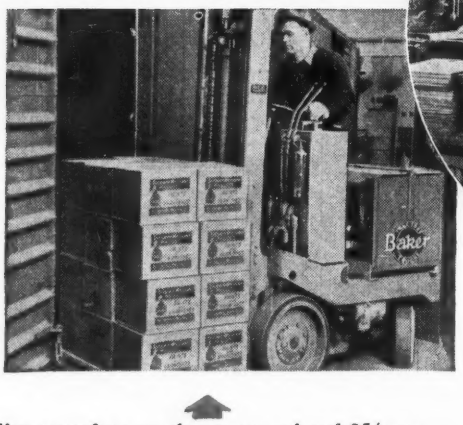
A large aircraft producer saves time by delivering cutting oils to machines with this mobile "service station" on a Baker Truck.



A printer and publisher saves thousands of dollars annually in warehouse rentals by tiering stock with a Baker Truck.

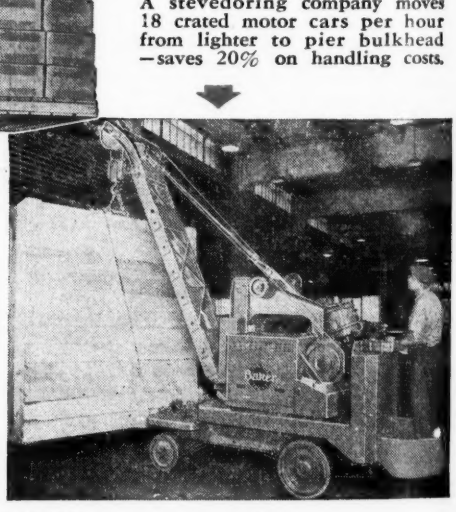
A stove manufacturer reduced handling costs from 35¢ to 4¢ per ton on a single operation. Overall costs were reduced 75%.

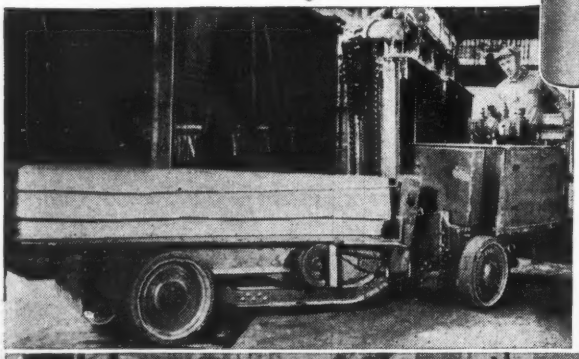
A stevedoring company moves 18 crated motor cars per hour from lighter to pier bulkhead—saves 20% on handling costs.



Carloading costs for one plant were reduced 25¢ per ton or $12.50 per car, releasing 7 men for other jobs.

This Baker Articulated Sheet Handler loads 200 tons of large sheets per hour and saves a steel mill $4.30 per ton.





A company saves $7,956.00 per year on handling costs in one of its warehouses with a system using a Baker Truck.

The Baker Material Handling Engineer can show you how similar savings may apply to your plant. Phone our nearest agent—or write us direct.

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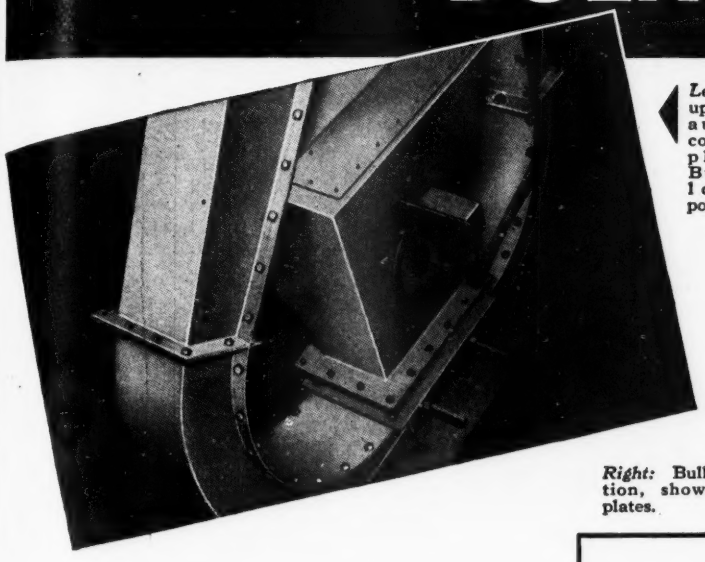
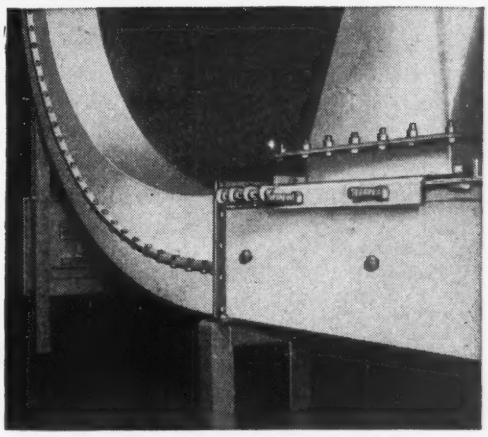
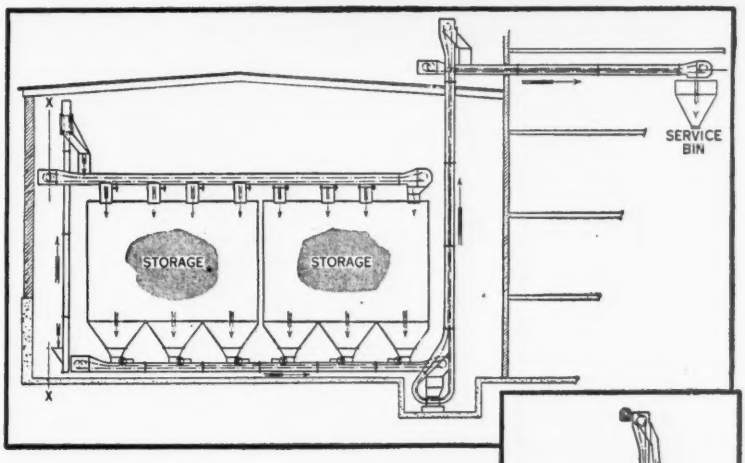
FOUND-- a Simple Low-cost Way to Handle BULK MATERIALS

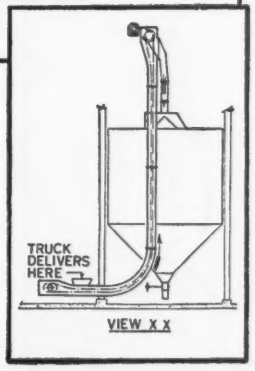


Left: Close-up showing automatic control applied to Bulk-Flo loading point.



Right: Bulk-Flo feed section, showing adjusting plates.





Sketches above and right show Bulk-Flo installation in a sugar pulverizing plant. Thirty tons of granulated sugar per hour are handled from trucks to storage bins by vertical and horizontal Bulk-Flo units. Three other Bulk-Flo units with automatic controls transfer the sugar from storage bins to a service hopper at 7½ tons per hour.

9034

• Link-Belt Bulk-Flo . . . the single-unit, self-feeding, self-discharging elevator-conveyor-feeder . . . is built to handle almost any job of moving flowable, granular, crushed, ground or pulverized materials of a noncorrosive, non-abrasive nature under any loading conditions.

It requires little space and practically no maintenance; it is dust-tight; its split discharge construction assures a minimum of breakage or degradation, making Bulk-Flo ideal for materials requiring careful handling. Bulk-Flo cuts handling costs by removing the limitations of other methods.

Submit your bulk materials handling problems to us in full confidence. Write for Bulk-Flo Book No. 2075.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal cities.

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Paisley Scientific Adhesive Service starts work immediately upon receiving samples of the materials to be bonded. Trained Paisley Adhesive technicians scientifically select the one perfect adhesive formula to suit the materials, papers, cartons, etc., submitted. An Adhesive Operation Data Sheet will be forwarded to guide you in supplying us with the information we need. This is the modern way to obtain an adhesive that will give greatest speed and efficiency in your bonding or packaging operations. Start now. Buy your adhesives this new, this *better* way. Write our nearest laboratory for an Adhesive Problem Data Sheet. At the same time be sure to mail the samples of the material to be bonded!

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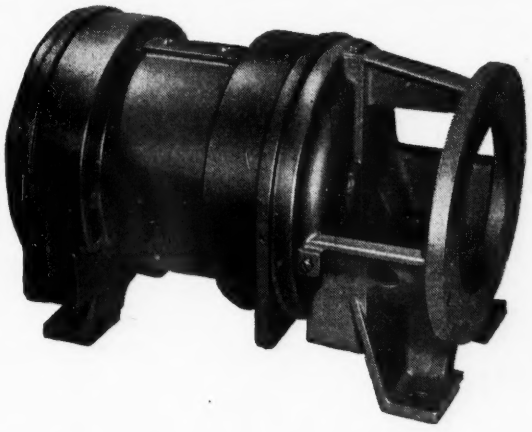
Two Clues

to Why A-C's Smooth-Running Electrifugal Pump is the Finest of its Kind!

Clue No. 1: One-piece shaft carries motor-rotor and pump-impeller on ball bearings—assures alignment and smooth operation. Cast bronze sleeve shields it from liquid being pumped.



CLUE No. 2: One-piece iron casting forms motor yoke, the bearing housing, pump bracket and feet—gives stability to entire unit. Saves 33% space, lessens chance of strain on parts or piping.

FINE ENGINEERING adds up to quality and value—and that's what Allis-Chalmers "Electrifugal" Pump now offers you! Entire unit is designed for efficient, dependable service—gives you maximum protection against dangers of abnormal wear, leakage, corrosion, vibration. For further information call our nearby office, or write ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 1929

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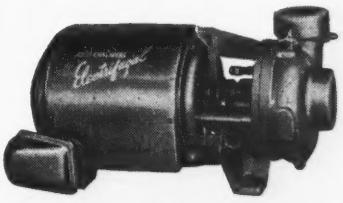
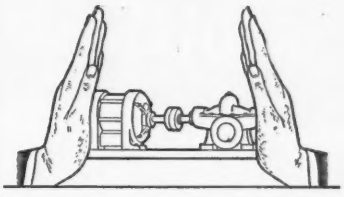
OIL COMPANY BUYS 100 *Electrifugal* PUMPS

TO MOVE volatile liquids such as gasoline, kerosene, naphtha from tank-car to storage tank, and into trucks—a large petroleum company depends on A-C Electrifugal Pumps. Try-out of first 15 pumps was so successful (big test: surge-shock when valves snap shut!), 100 units were ordered, more later re-ordered.

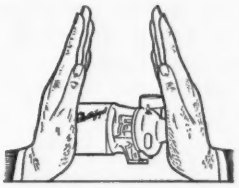


Electrifugal Capacities: 15 to 1600 gpm—heads up to 500 feet.

SQUEEZE PLAY CUTS PUMP SPACE 33%



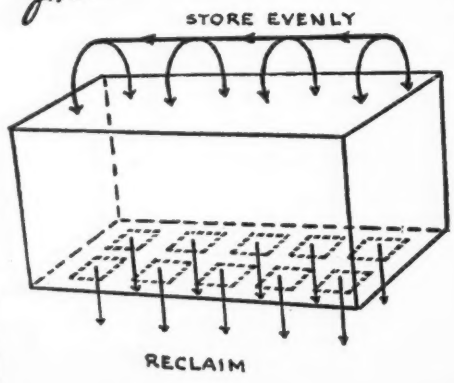
How can we couple a pump and motor together *better*—to save space, provide stability, rigid alignment?

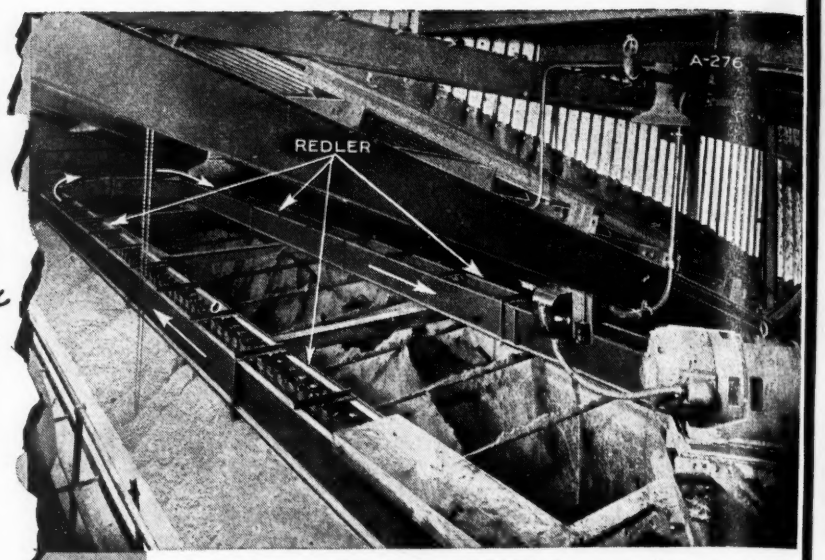


Electrifugal Design assures alignment and smooth operation, cuts space 33% — gives you greater pumping efficiency for your money!

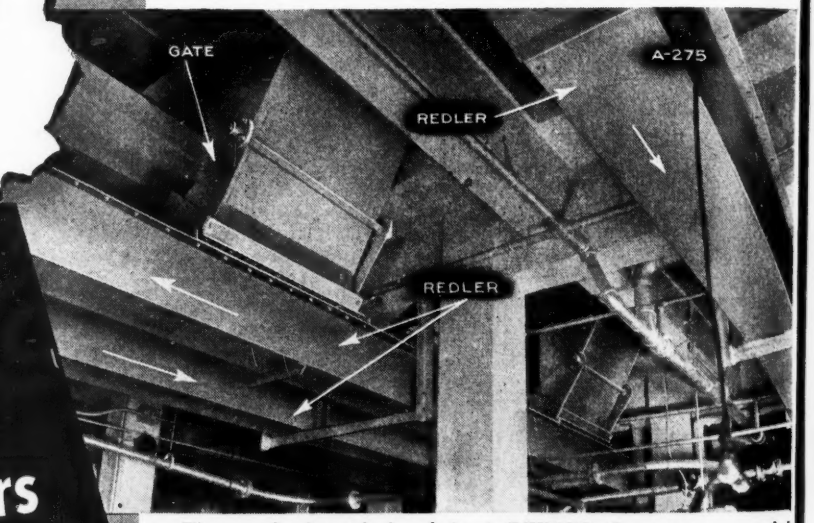
ALLIS-CHALMERS *Electrifugal* PUMPS

The Problem—
To distribute granular bulk sugar evenly for storage in a square-type bin, and reclaim it, keeping the product clean throughout the reclaiming process—





The Horizontal distributing REDLER Conveyor, above the bin, fills bin progressively to full height along the path of conveyor.



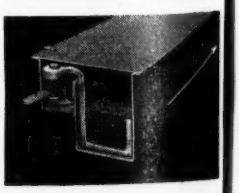
The two horizontal closed-circuit REDLER Conveyors, suspended beneath the bin, reclaim from any and all parts of the bin.

A Sweet Job for REDLER Conveyors

REDLER Conveyors and Elevators, arranged into efficient handling systems by S-A Engineers, handle food products quickly, take up little space and operate at low cost. Note the above example.

Granular sugar (it could be any other granular or powdered material) is distributed evenly throughout the storage bin by a horizontal closed-circuit REDLER Conveyor. On this particular conveyor, bottom plates were omitted (except at feed point) allowing sugar to pile up under the conveyor. As the bin fills, the sugar forms a natural bottom plate for the conveyor, progressively filling the bin as sugar can move only to unfilled parts of the bin.

Below the bin, two additional horizontal closed-circuit REDLERS withdraw sugar from any chosen part of the bin through gate controlled chutes and convey to discharge.



Small lump and granular bulk materials are moved without agitation and resulting breakage through sealed casings by skeleton type REDLER sidepull flights.

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Designers and Manufacturers of All Types of

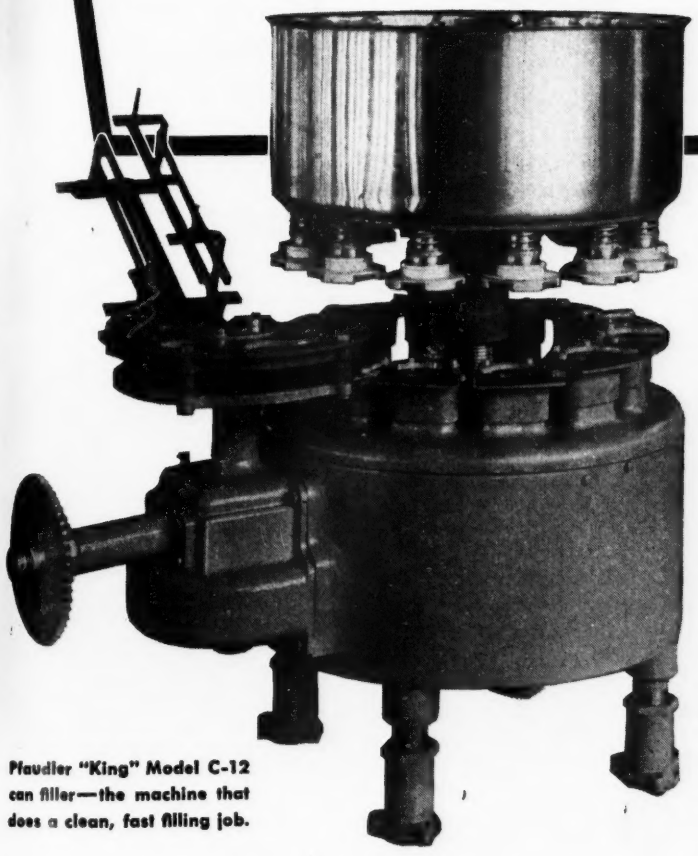
BULK MATERIAL HANDLING EQUIPMENT

for that 1946 Juice Pack...

GET PFAUDLER "KING" FILLERS

EQUIPPED WITH NON-AERATING VALVES!

Models C-12 and C-18 available for prompt shipment!



Pfaudler "King" Model C-12 can filler—the machine that does a clean, fast filling job.

Pfaudler "King" high-speed juice fillers will help you produce a better pack at minimum cost. For example, when equipped with the new sanitary, stainless steel non-aerating valves, these fillers keep the air content of juice far below that of other fillers. This feature alone is a compelling reason for selecting "King," but there are many more exclusive advantages as well.

The base and turret assembly are of one-piece construction. All working parts are fully protected against wash water and product penetration. Lifter plates and can centering chucks are made of bronze and *each* is equipped with *double lifter rods and bearings.* Besides adding stability and longer life, they make the Pfaudler "King" smooth operating machines.

Filler bowl is of deep dish stainless steel construction. This gives the product better head pressure for fast, clean filling. A screw adjustment provides for raising or lowering bowl and valve assembly as needed.

Stocks of Model C-12 and C-18 Pfaudler "King" fillers will permit delivery beginning January, 1946. You are urged to place orders immediately. Literature on request.

	Model C-12	Model C-18
No. of valves	12	18
Can sizes—Diameter	202 to 404	202 to 404
Height	308 to 700	308 to 700
Floor space	50" x 30½"	60" x 62"

Pfaudler

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Glass-Lined Steel . . . Stainless Steels . . . Nickel . . . Inconel . . . Monel Metal

YOUR PRODUCT COULD CLAIM AS MUCH!

A Breakfast Cereal Says . . .
"Enriched Farina containing wheat embryo, thiamine (Bi), iron phosphate, niacin (the anti-pellagra factor), and tricalcium phosphate (calcium)."

A Food Beverage Says . . .
". . . a delicious, nourishing beverage when mixed with milk. Two glasses a day supply adults with . . . 1½ the (daily) requirements of Calcium and Phosphorus, 5 times the requirements of Iron."

Another Breakfast Cereal Says . . .
"Leading physicians and nutritionists say these vitamins and minerals (Calcium and Iron) are especially important to growing children. Both Calcium and Vitamin D help make well-formed bones and teeth."

A Milk "Booster" Says . . .
"Fortified for health . . . fortified, per ounce, with 200 U.S.P. Units Vitamin D (activated ergosterol), .005 grams organic iron."

HERE'S HOW MINERAL FORTIFICATION HELPS SELL THESE POPULAR FOOD PRODUCTS

Today . . . many popular foods are fortified with minerals. Equally important is the fact that details of such enrichment is prominently displayed on package labels . . . *because it helps in selling!*

Other considerations being equal, it is only natural that a housewife will prefer . . . and buy . . . those products that provide the minerals which nutrition authorities agree are so essential to good health and well being.

Today, there is hardly a product that could not claim mineral fortification . . . because Victor mineral supplements can readily be incorporated in most staple foods such as bread, flour, cereal, soup, candy and the like. See what Victor mineral supplements can do for *your* product! For over 40 years Victor Chemical Works has specialized in the production of food grade phosphates and mineral supplements. Our technical staff will be glad to offer any assistance possible.

VICTOR *Mineral Supplements*

Monocalcium Phosphate
Dicalcium Phosphate
Tricalcium Phosphate
Calcium Pyrophosphate
Sodium Iron Pyrophosphate
Ferric Orthophosphate
Ferric Pyrophosphate

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WORLD'S LARGEST MANUFACTURERS OF FOOD PHOSPHATES
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Greatest V-Belt Show ON EARTH!

EVERY MEMBER OF ALLIS-CHALMERS GREAT NEW V-BELT TEAM IS SPECIALLY DESIGNED, TESTED AND BUILT TO LICK A SPECIFIC DRIVE PROBLEM, SAVE YOU MONEY AND TROUBLE

DON'T WORRY IF YOUR BELTS MUST PRACTICALLY BATHE IN OIL OR GREASE. JUST ASK FOR SUPER-7 OIL-PROOF. I'M MADE OF IMPERVIOUS NEOPRENE.
OIL

Texrope V-belts are available nation-wide through Allis-Chalmers Dealers and Sales Offices. It pays to make Allis-Chalmers your V-belt drive headquarters.

ALLIS-CHALMERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.

A 1961

BULLETIN!

SPEED RECONVERSION WITH HELP OF NEW FREE A-C KIT!

Guide to "How to Take Reconversion Inventory" of Drives, Motors, Pumps

Help in the big job of reconverting for peacetime production is now offered to plants everywhere by Allis-Chalmers Mfg. Co., its district offices and distributors. To all who request it, we're sending the new "Reconversion Inventory Kit", planned to speed the task of determining the condition of your existing equipment — V-belt drives, motors, and centrifugal pumps — which will be used in reconverted production.

SUGGESTS PROCEDURE, STATES STANDARDS

Used by foremen, maintenance men, and engineers, the Kit is a real time-saver . . . leads efficiently to probable trouble spots, helps clear them up. Gives bearing tolerances, resistance formulae, etc., in compact, easily-used form. Check List appraisal charts help determine present and future condition of units inventoried.

HOW TO GET YOUR KIT

For your free Reconversion Inventory Kit, call your nearest Allis-Chalmers distributor or district office, or write Dept. 92, ALLIS-CHALMERS MFG. CO. Milwaukee 1, Wis.

ALLIS-CHALMERS MFG. CO.
Dept. 92, Milwaukee 1, Wis.

Please send Reconversion Inventory Kit free of charge to:

Company.....

Address.....

.....

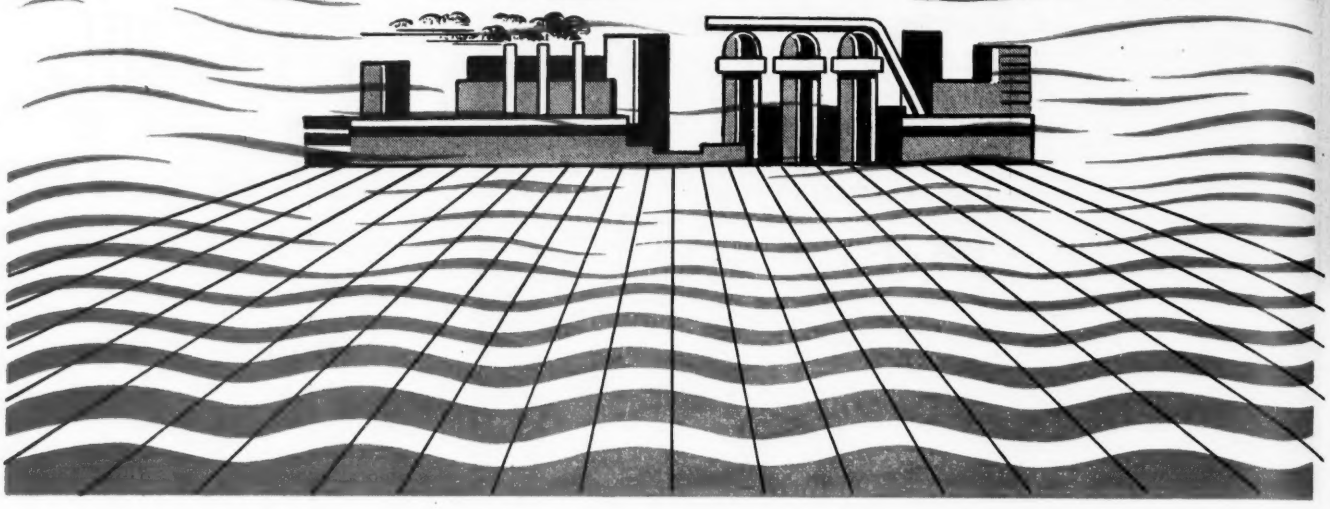
Attn. of Mr.....

HEAR THE BOSTON SYMPHONY: *Saturday, American Broadcasting Co.*

HAVE YOU INQUIRED HOW

THERMONICS*

CAN IMPROVE, SIMPLIFY

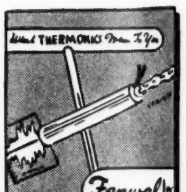


YOUR PRODUCT, YOUR PLANT, YOUR POST-WAR PLANNING

* **THERMONICS** is the science of temperature control developed by Fenwal, Incorporated, by the direct process of determining the needs of industry and science for unerringly accurate thermal control of wide applications. Many thousands of applications and tests have proven the efficacy of the *Fenwal Thermoswitch*, prime factor of this refined and exact science of Thermonics, which takes its place of due importance in the field of temperature control and thermal regulation.

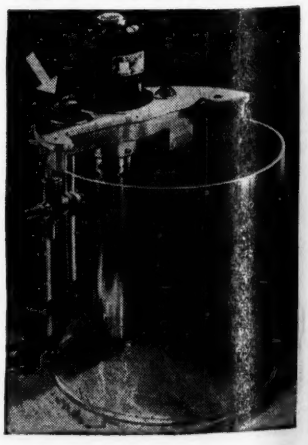
Thermonics as a science in itself earns and deserves the attention of:

- all processes and production requiring regulation of extreme or moderate temperatures;
- makers of equipment requiring light weight, compact, efficient thermal regulation;
- makers and users of machinery, equipment, vehicles, wherein a safety factor of controlling or indicating excessive or dangerous changes in temperature is essential.



THERMOSWITCH is the prime factor in Thermonics. So many are the functions of THERMOSWITCH, and so comprehensive is the field of Thermonics, that practically all processes of manufacture requiring accurate thermal regulation are served by THERMOSWITCH. Few, if any products whose efficiency depends on temperature control, exist today or are planned, that can omit the consideration of Thermonics in basic engineering *and the use* of THERMOSWITCH *for functional competency* and economy of operation. THERMOSWITCH in its many types and adaptations, offers a lightweight, compact vibration-proof, highly sensitive yet rugged regulatory and detectory unit of almost unlimited utility.

● Fenwal's data folder on Thermonics will prove of value to engineers. Your copy is ready for you. ●

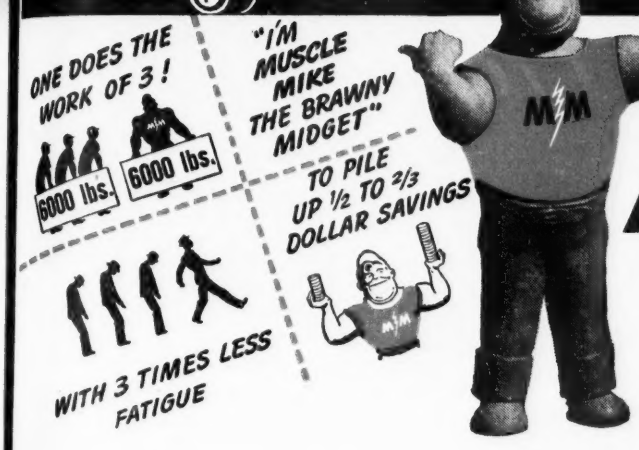


Fenwal, Inc.

THERMOSWITCHES

FOR COMPLETE TEMPERATURE CONTROL

19 Pleasant Street, Ashland, Massachusetts


ONE DOES THE WORK OF 3!
6000 lbs.
6000 lbs.
"I'M MUSCLE MIKE THE BRAWNY MIDGET"
TO PILE UP ½ TO ⅔ DOLLAR SAVINGS
WITH 3 TIMES LESS FATIGUE

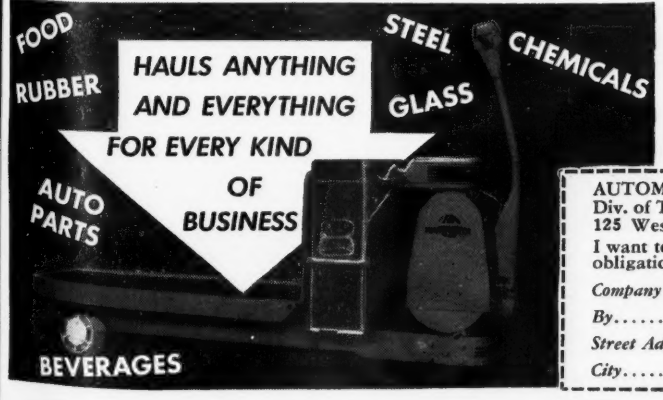
It's Yours to Use *FREE* in Your Own Plant For 3 Days!

to demonstrate it will cut *YOUR* handling costs at least IN HALF

All industry is using this Miracle Electric Truck. In its motor is a Muscle Mike . . . a brawny midget of electric power that moves up to 6000 pounds with amazing "touch-of-your-thumb" ease.

Its name is Automatic Transporter. You haven't a handling job it can't lick. One man or girl at the control buttons does the work of three husky laborers. That's two-thirds saving in labor alone. Forget about drudgery and fatigue. It's next to nothing. Take it in and out of tight places that would put even hand trucks to shame. It comes through for you without a whimper.

But don't take our word for it. Put it to the test . . . put it over the severest hauling hurdles in your own plant. See if it doesn't do for you, the great job it has been doing for industry everywhere. Mail the coupon, and we will arrange delivery. First come, will of course, be first served. There is absolutely no obligation to buy . . . no strings attached whatsoever.



***Remember:* Only AUTOMATIC *Makes the* TRANSPORTER**

TRANSPORTER

A PRODUCT OF AUTOMATIC

LIGHTENS LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
Div. of The Yale & Towne Mfg. Co.
125 West 87th Street, Chicago 20, Illinois

I want to put Automatic Transporter to work for me for 3 days free of all cost and obligation. Deliver it to my plant at as early a date as possible.

Company Name.....

By.....*Position*.....

Street Address.....

City.....*State*.....

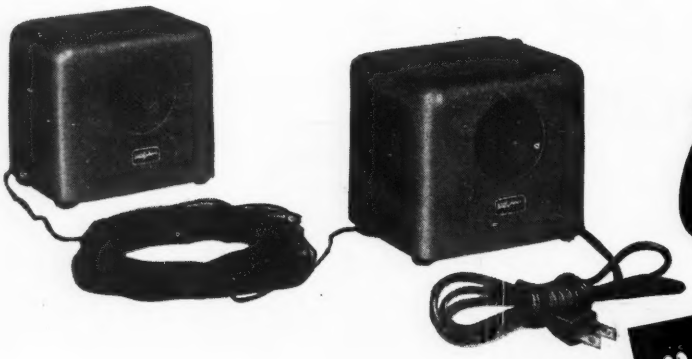
ELECTRONIC LABORATORIES'

NEW

Utiliphone

IN A

"Package by Inland"



As important as your Product itself, is the Package entrusted with its safe delivery. Design, bracing, padding, etc., are correct when your Product is in a—

"Package by Inland"

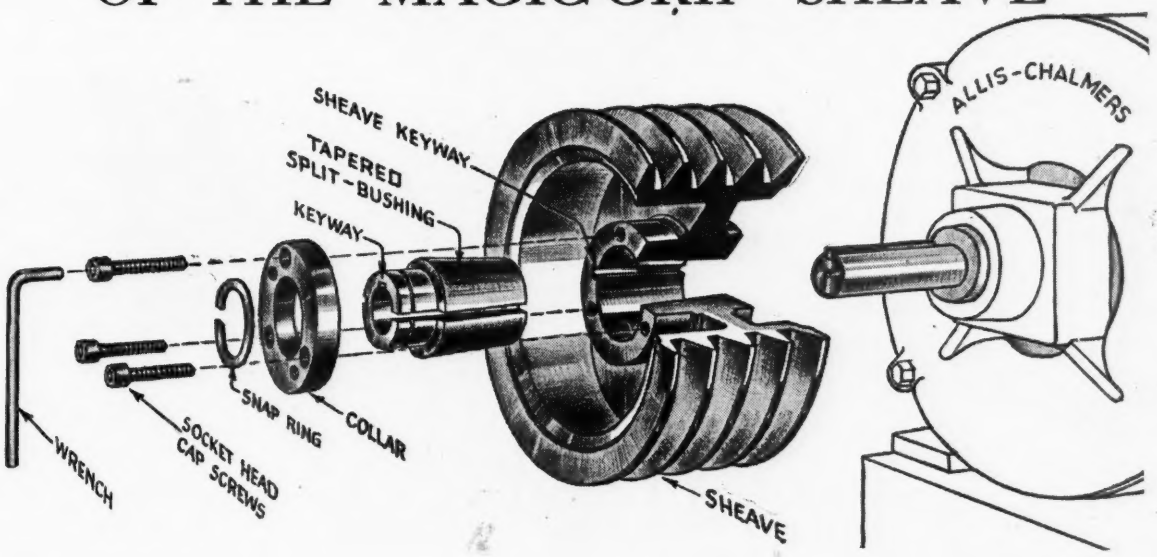
INLAND

CORRUGATED FIBRE BOXES

INDIANAPOLIS, IND. • MIDDLETOWN, OHIO • EVANSVILLE, IND. • MILWAUKEE, WIS. • DETROIT, MICH.

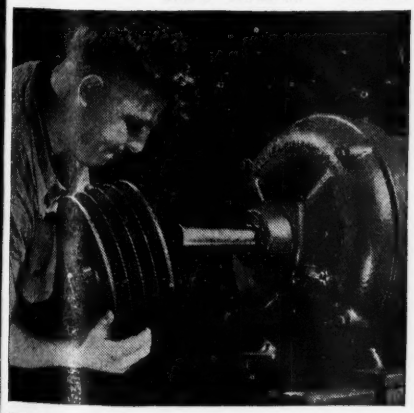
Here's the Inside Story

OF THE "MAGIC-GRIP" SHEAVE

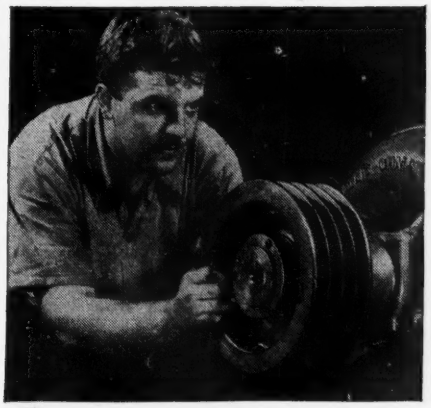


Exploded view shows why Allis-Chalmers' new "Magic-Grip" Sheave goes on *as a unit in 2 easy steps.* It's the fastest mounting sheave on the market—at no extra cost.

SEE HOW "MAGIC-GRIP" GOES ON QUICKLY AS A UNIT IN 2 EASY STEPS



1 Place sheave on shaft. Slides on smoothly because clearance is provided by expanded bushing. There's *no* hammering — *no* forcing! Complete sheave and bushing unit comes intact—ready for quick, easy mounting.



2 Align exactly, using straightedge, (It's easy with this free-sliding sheave.) Then tighten three capscrews; sheave is locked to shaft, *grips like magic!* No set screws to damage the shaft. Write for Bulletin B6310.

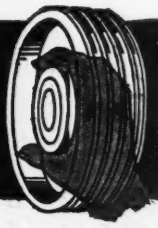
RECONVERTING?

GET THIS NEW FREE KIT!

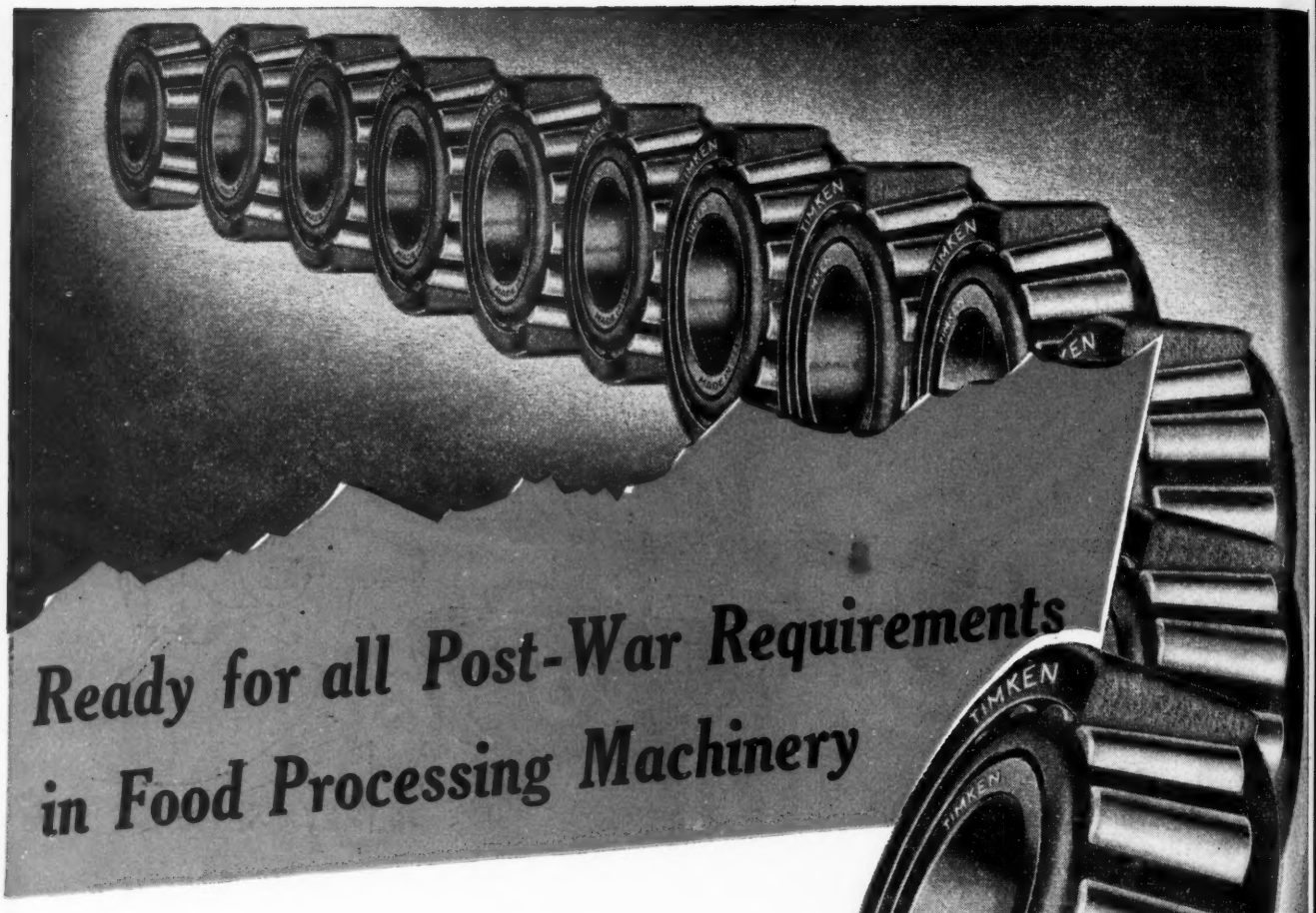
To help you find out how your present equipment will fit into future production, A-C offers a new free "Reconversion Inventory Kit" — Fact Sheets and Check Lists to speed your appraisal of V-belt drives, electric motors, and centrifugal pumps. Applies to all makes. Call your A-C distributor or district office, or write Dept. 39, ALLIS-CHALMERS MFG., Milwaukee 1, Wisconsin.

A 1858

Allis-Chalmers Texrope

"MAGIC-GRIP"  **SHEAVES**

HEAR THE BOSTON SYMPHONY: *Saturday, American Broadcasting Co.*



Ready for all Post-War Requirements in Food Processing Machinery

Timken Tapered Roller Bearings are meeting the problems of industrial reconversion as they have met other industrial demands and emergencies during their 47 years of development.

Many radical changes and improvements are being made in post-war machines of all kinds, bringing with them new requirements in bearing applications.

That Timken Bearings can be depended upon to meet every need successfully, is an assurance based on our past experience and success in putting one industry after another on a Timken Bearing Equipped basis.

Thus today there is hardly any kind of mechanical equipment that does not have the economies and other advantages of Timken Bearings.

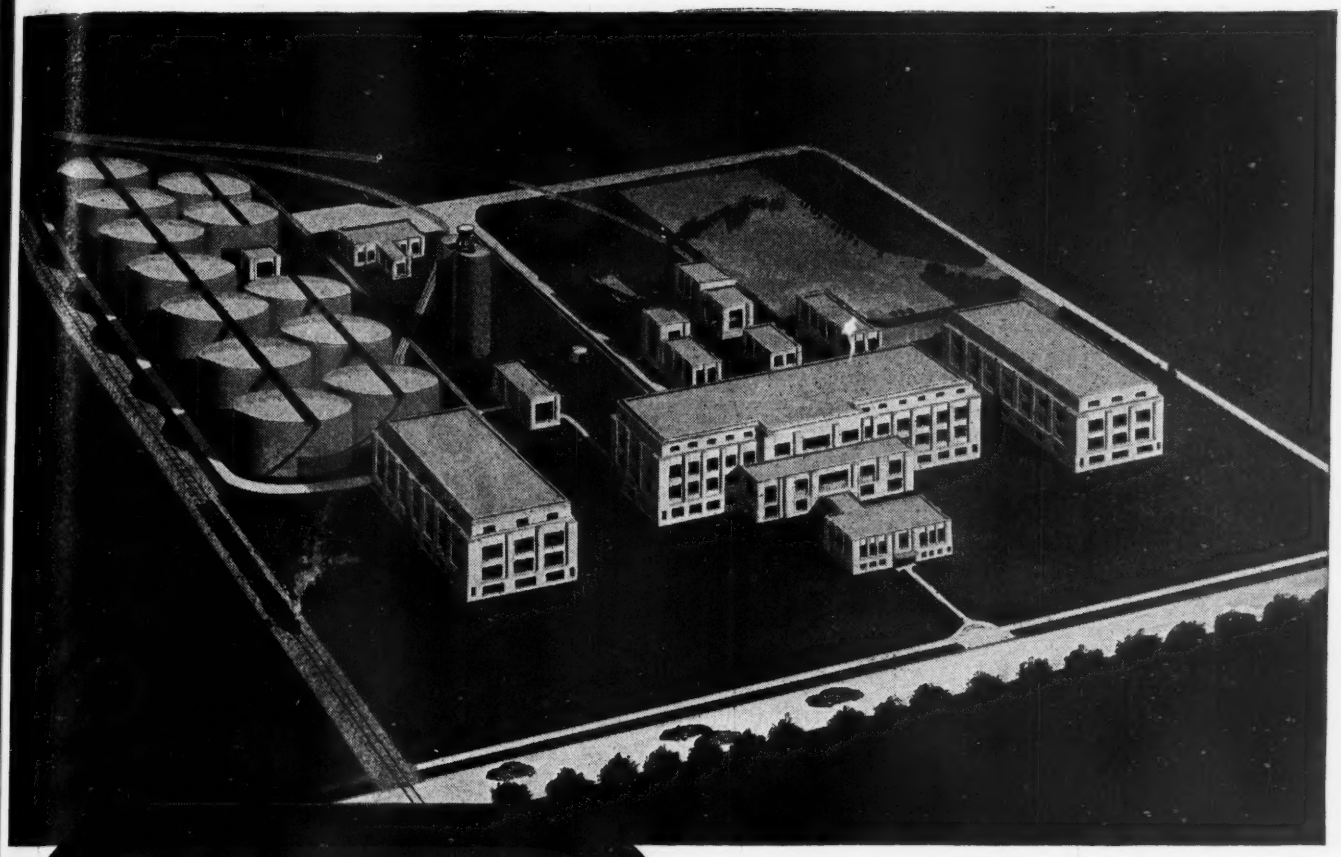
To be sure of getting tapered roller bearing advantages in full—including friction elimination; radial, thrust and combined load capacity; and ability to hold many parts in constant alignment; make sure the trade-mark "TIMKEN" is stamped on every bearing that goes in your equipment.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



Amino Products

To meet the rapidly growing requirements of quality food processors for Mono Sodium Glutamate, International Minerals & Chemical Corporation is building a new plant at San Jose, California, to supplement production at its Rossford, Ohio, plant.

The new San Jose plant will be in production in 1946. It will be completely modern in design and construction, with every facility to utilize the technological "know-how" gained by years of research and production experience.

Mono Sodium Glutamate is the salt of one of the Amino Acids, a pure vegetable food product produced from the hydrolysis of wheat or sugar-beet proteins. It is well known among epicures, in this country and the Orient, for its unique quality of enhancing the subtle and delicate flavors of fine foods.

Rapid progress has been made in recent years by American food technologists in the development of new uses for Mono Sodium Glutamate to satisfy discriminating consumers' outstanding preference for quality foods.

Amino Products looks forward eagerly to the time when greatly expanded production of Mono Sodium Glutamate, at the San Jose and Rossford plants, will make possible its extensive use by America's leading food processors to give millions of people new pleasure and delight in their enjoyment of fine foods.

Glutamic Acid, Glutamic Acid Hydrochloride, Betaine Hydrochloride, and other Amino Acids and Protein Derivatives will also be produced at both the San Jose, California, and the Rossford, Ohio, plants for food and pharmaceutical purposes.

Amino Products

Food and Pharmaceutical Division

International MINERALS & CHEMICAL CORPORATION • GENERAL OFFICES: 20 NORTH WACKER DRIVE, CHICAGO 6

CP Oil-less Cylinder Compressors have been developed for use where the air or gas compressed must be free from oil. No oil, grease or other cylinder lubricant is required. Piston and rod, completely supported by crossheads, are full floating, removing all weight from cylinder walls and stuffing boxes, thereby avoiding wear of carbon piston rings and hardened steel cylinder liner. Trouble-free operation and long life of wearing parts are assured. Only normal maintenance is required — no need for periodic rotation of piston rings.

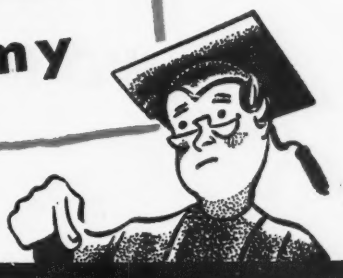
CP Oil-less Cylinder Compressors are arranged for belt, motor or steam drive, in single stage and two-stage types. They are available in a wide range of sizes and ratings. Write for complete information.

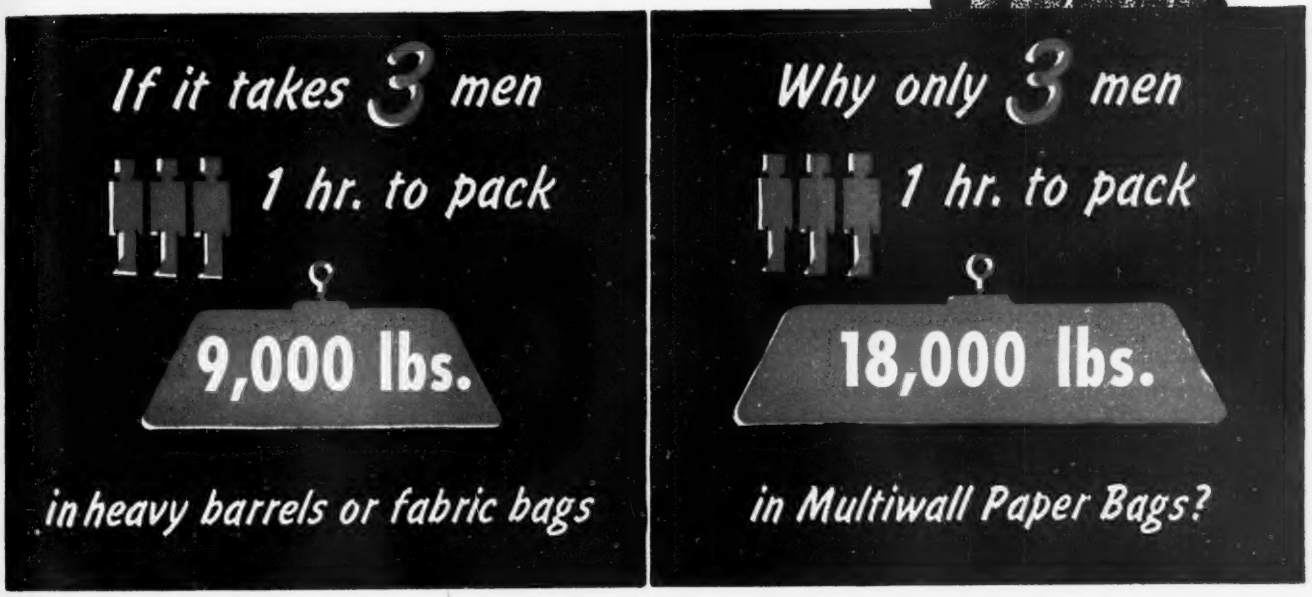
★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

A Simple Example of Multiwall Bag Economy





Greater packing speed is only one of the advantages of Multiwall Bags and Bag-filling Equipment.

Multiwall Bags actually improve working conditions. They are tight and siftproof. They are compact and easy to handle.

With Multiwall Paper Valve Bags, your product is accurately preweighed . . . before the bags are closed. And, the bags require no tedious shaking by hand to assure proper settlement.

Multiwalls are closed automatically by the internal pressure of their contents. There is no bother with troublesome lids or hand-sewing. By this method, a single man, operating two filling machines, can keep two other men busy checking and stacking the bags at the rate of 18,000 lbs. per hour.

Space-Saving Advantage

Five hundred empty 100-lb. Multiwall Paper Bags can be stored in approximately the same space as one 200-lb. barrel. Think what this means in saving valuable plant floor space.

In fact, Multiwalls mean economy and improved packaging all along the line. These bags will be specially made to fit your particular requirements. For full information, write your nearest St. Regis office today.

St. Regis MULTIWALL PAPER BAGS

MULTIPLY PROTECTION • MULTIPLY SALEABILITY

ST. REGIS PAPER COMPANY

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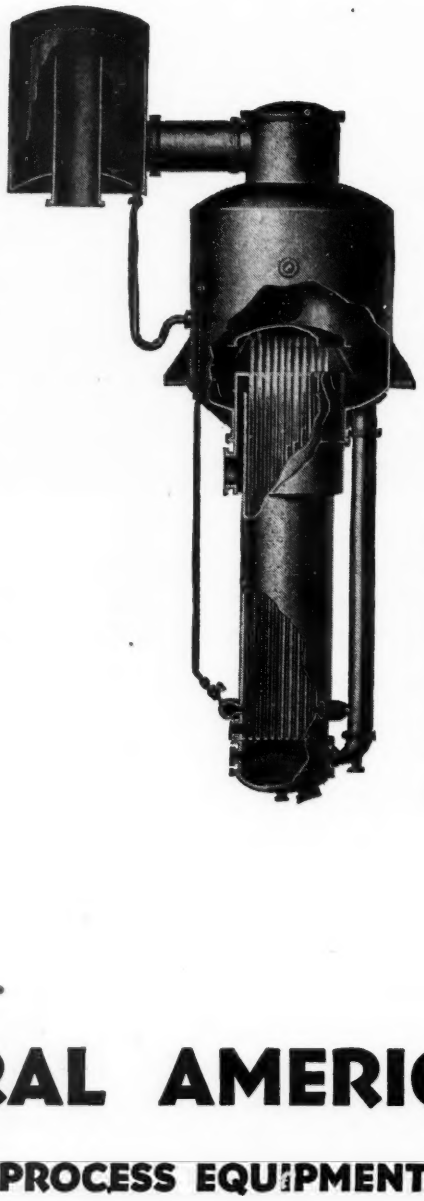
GENERAL AMERICA

WE HAVE FACILITIES AND EXPERIENCE TO

CONKEY EVAPORATORS

. . . used in the production of high quality food products give superior performance through immaculate cleanliness, high production and economical operation.

Conkey Vacuum Evaporators are fabricated in stainless steel for all contact with the products handled and in single or multiple effect. The completely polished surface of stainless steel facilitates the cleaning and sterilization operation. The long tube recirculation type provides for cleanliness by ready access to tubular surface without the necessity of man-entry.



CONKEY FILTERS AND EVAPORATORS, TURBO-MIXERS, PETERSON SYNCRO DRUM FILTERS, GENERAL AMERICAN HYDROSEPARATORS AND CLASSIFIERS, AMERICAN DRUM DRYERS, REICH PROCESSES, LOUISVILLE ROTARY DRYERS, COOLERS AND PRESSES

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RICAN designs and builds

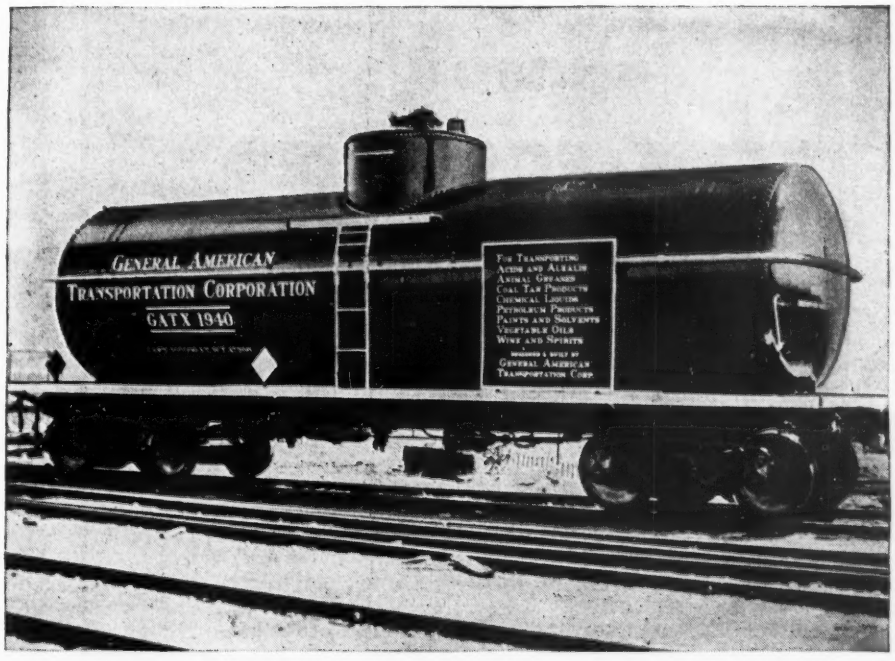
TO HELP SOLVE YOUR PROBLEMS

LATE FABRICATION OF EVERY KIND

GATX" Tank Cars — famous roughout the world — are but ne of the many diversified roducts of steel fabrication by eneral American.

ou name it, we'll build it . . . om any carbon, stainless, or lloy steel, aluminum or other pecial alloy, either welded or veted.

completely equipped fabri- ting plant with facilities for -raying, heat treating, stress re- eving—consulting engineering rvice, chemical and physical sting laboratory, specialized ganization for field erection. *rite* for all the facts.



TANK CARS, PRESSURE VESSELS, KILNS, HEAT EXCHANGERS, STILLS, PREHEATERS, DIGESTERS, PRODUCT TANKS, BINS, PENSTOCKS, SCRUBBERS, CRYSTALLIZERS, CREOSOTING CYLINDERS, ETC.

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PLATE AND WELDING DIVISION

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Louis . . . Salt Lake City . . . San Francisco . . . Tampa . . . Washington, D. C.

Louisville, Kentucky

Now available in limited quantities!

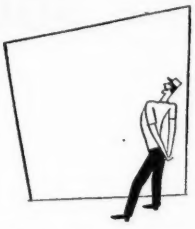
Johnson's WAX-FORTIFIED Interior Finish

Unobtainable during the war years, Johnson's WAX-FORTIFIED Interior Finish is now available in limited quantities. Additional materials are being received and soon we will be back to full production. One of the most remarkable achievements in paint manufacture in 25 years, this patented maintenance finish is impregnated with wax, and brings the advantages of wax-fortification to painted walls, ceilings and woodwork.

Yet it presents no refinishing problem. The wax in no way retards adhesion. No special cleaning is necessary. Repainting may be done with WAX-FORTIFIED or with ordinary paint.

WAX MAKES THE DIFFERENCE

in this patented maintenance finish that offers these 4 advantages:



1 *Rich lustrous beauty* that only wax-fortification can give.

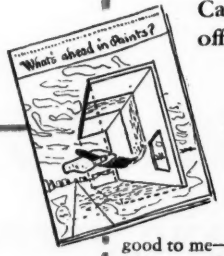
2 *Decorating cycle lengthened,* because Wax-Fortified lasts longer. Remarkable durability resists stains and mars . . . repels dirt.

3 *Easier cleaning,* when finally necessary, because of the wax. Film retains its rich glow for the life of the finish. Resists caustic cleansers.

4 *High light reflection longer—better light diffusion.* Satin-smooth finish — no harsh glare. Easier on the eyes.

★

Call your nearby S. C. Johnson office or fill out and mail this coupon TODAY!



S. C. Johnson & Son, Inc., Dept. FI-125
Maintenance Products Dept.
Racine, Wisconsin

Gentlemen: Wax-Fortified sounds good to me—I'm interested in talking to one of your salesmen. Also, please send the "What's Ahead in Paints" brochure.

*Name*_____

*Address*_____

*Business or Institution*_____

Made by the makers of
JOHNSON'S WAX

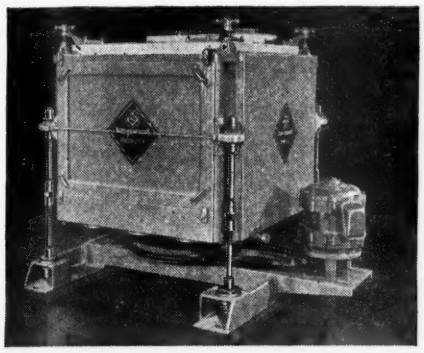
A name everyone knows

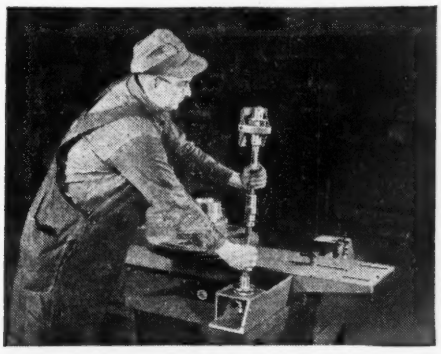
S. C. Johnson & Son, Inc., Racine, Wisconsin

HELP HOLD THE LINE AGAINST INFLATION WITH MORE VICTORY BONDS!

4 Reasons

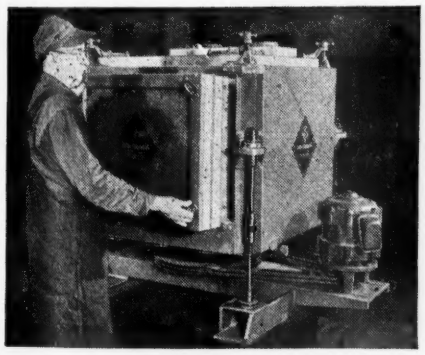
WHY LOW-HEAD IS THE NO. 1 SIFTER ON THE MARKET

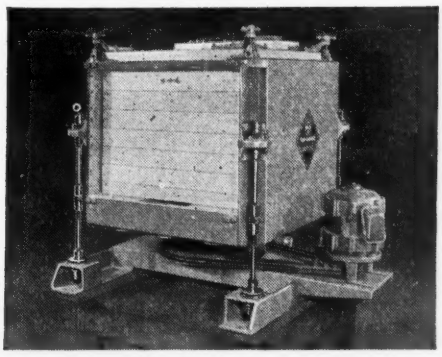




1 It's *compact*—can be installed in *less* space than most sifters! One reason is that it's unit designed — sifter, motor, drive and base are *all* built by *one* company.

2 It's *flexible.* Entire sifter body rides *smoothly, noiselessly,* almost *effortlessly* on 8 flexible couplings that eliminate destructive vibration, reduce wear!





3 It's *convenient.* Side-opening makes it easy to inspect or interchange sieves. Power cost? Just a *few cents a day* for continuous, 24-hour operation!

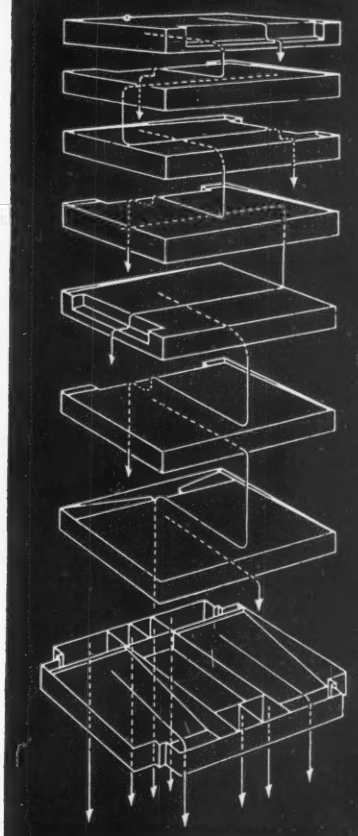
4 It has *bigger capacity,* size for size, than any other sifter! Assures *continuous, accurate* separation on a wide range of products from 4 to 200 mesh!

WANT TO KNOW THE SECRET of modern, up-to-date sifting? Watch the "Low-Head" Gyratory Sifter *in action* — rebolting flour at 325 rpm, 125 barrels an hour, 24 hours a day! One company did. Result: they ordered 2 "Low-Head" Sifters ...*then 15 more*... then 25 MORE!

Hundreds of "Low-Head" Sifters are at work today—in milling, food, chemical industries. Perhaps they can do a job for *you.* See our nearby district office, or write ALLIS-CHALMERS, MILWAUKEE.

A 1850

See How Quickly, Easily, A-C Low Head Sifter Gives You 2 to 8 Separations!

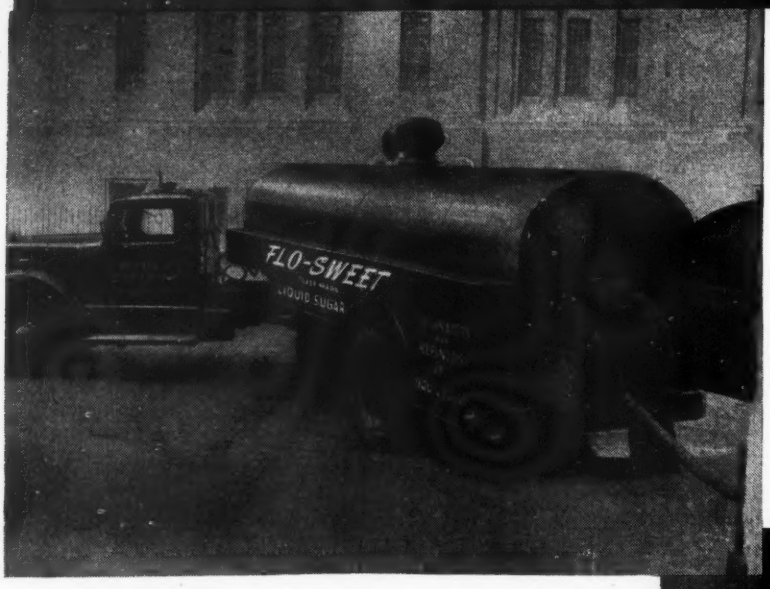


Here's what happens: Part of entering material passes *through* top surface of 1st sieve—is removed. Remainder passes over surface, through channel to 2nd sieve. Material continues *through and over* remaining sieves in like manner, with separate products being taken off through individual discharge openings in bottom hopper.

Allis-Chalmers

MILWAUKEE 1, WIS.

A new concept of..

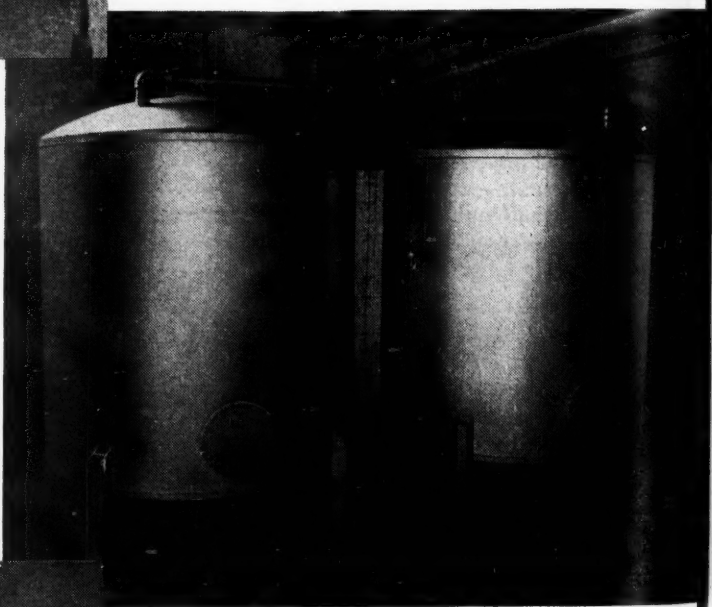


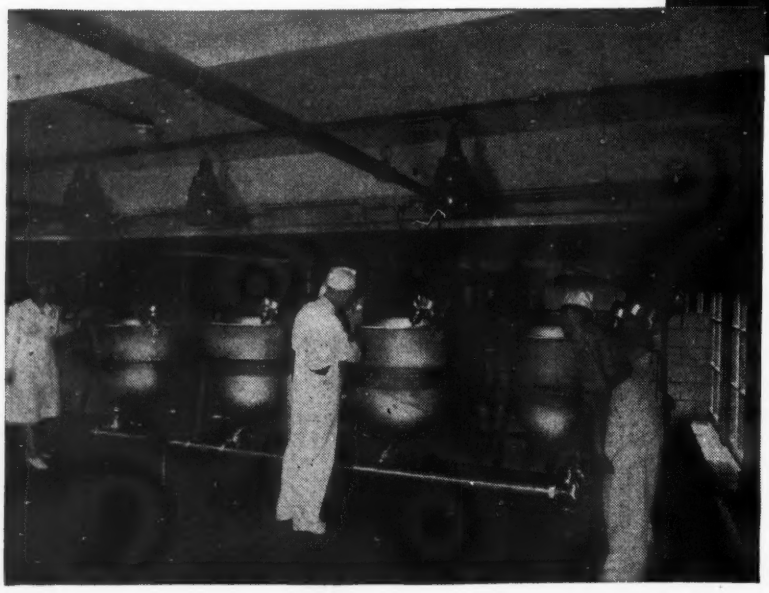
FILTER-CLEAN IN *delivery...*

Flo-Sweet Liquid Sugar is delivered to your plant in tank trucks or tank cars. The sugar is then pumped directly to storage tanks, through a pipe line connection. There's no manual handling, no chance for contamination.

FILTER-CLEAN IN *storage...*

Flo-Sweet Liquid Sugar is stored in specially constructed tanks until you are ready to use it. These tanks can be located in an out-of-the-way corner of your plant. Valuable storage space you can put to productive use is saved.





FILTER-CLEAN IN *use...*

Flo-Sweet Liquid Sugar goes into process at the simple turn of a valve. So easy even women operators can do it. Exact quantities are accurately meter-measured. Through all three steps there's no chance for dirt or bag lint to get into your sugar. IT STAYS CLEAN!

SUGAR CLEANLINESS

Flo-Sweet Liquid Sugar is filter-clean from refinery to your kettles

Before Flo-Sweet came along, sugar contamination was a constant threat to food manufacturers.

Lint sometimes worked out of the bag fabric into the sugar. There was always the danger of contamination from one cause or another during delivery, storage and use. All this in spite of the fact that sugar is perfectly clean when it leaves the refinery.

New Foolproof Method

Therefore, we said to ourselves, why not keep the sugar in liquid form? In that way it can be delivered in sterilized tank trucks or tank cars, pumped directly to storage tanks, and go into process at the turn of a valve. There'll be no chance for contamination.

IT WORKED!

Users of Flo-Sweet Liquid Sugar find that month after month, year after year, the sugar they put into process is always filter-clean. Justification enough for changing from granulated to Flo-Sweet!

Other Advantages

But they also find that Flo-Sweet eliminates handling, speeds up production, makes more effective use of available manpower, and provides other important advantages. Thereby, it saves money . . . pays for itself in 9 months or less.

It's no wonder, that in the past 25 years so many important food processors have installed Flo-Sweet Liquid Sugar Systems. You owe it to yourself to find out what Flo-Sweet can do for you in your plant.

FLO-SWEET

(TRADEMARK)

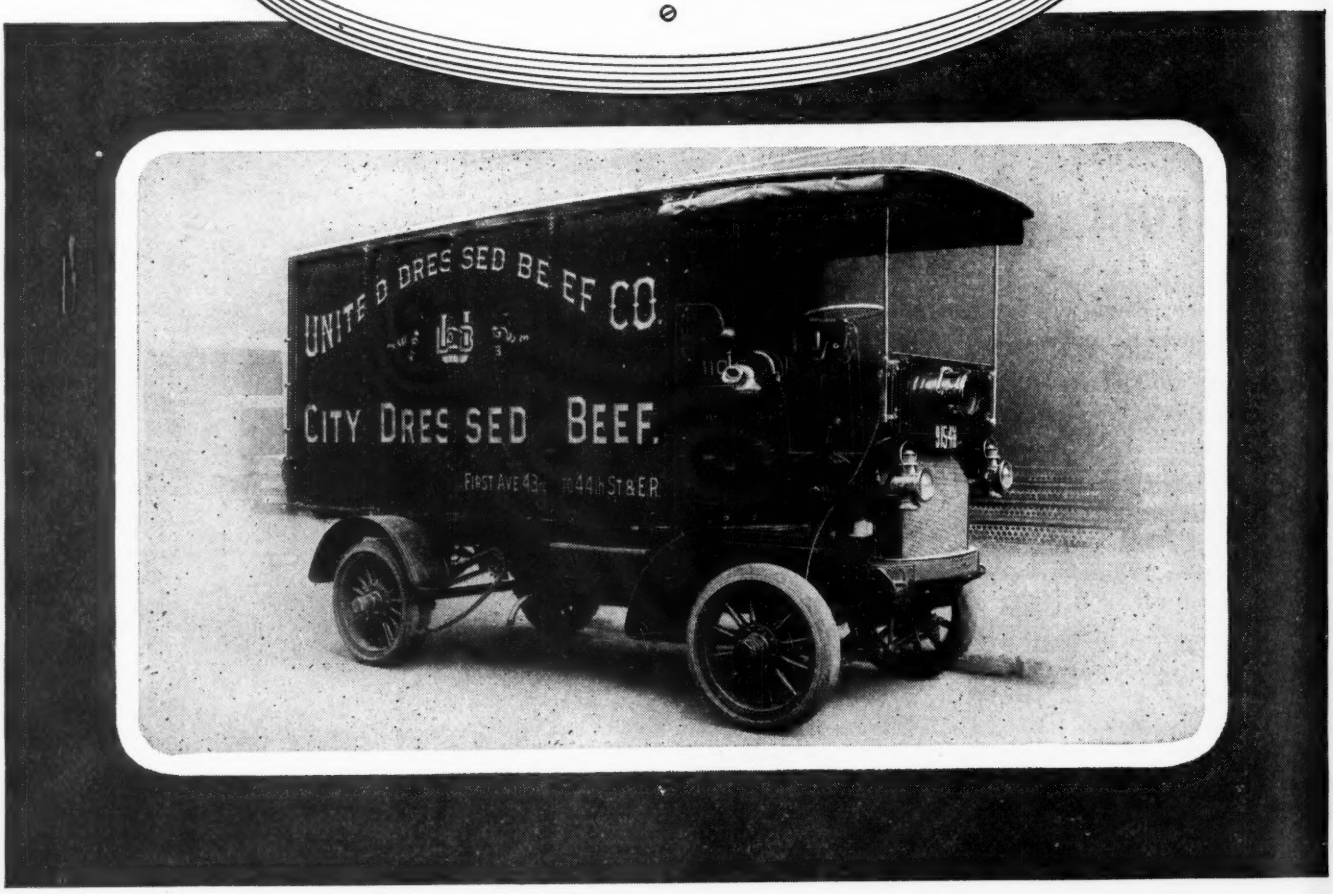
LIQUID SUGAR

A product of REFINED SYRUPS & SUGARS, INC., Yonkers 1, N. Y.

ORIGINATORS AND REFINERS OF LIQUID SUGAR

COPYRIGHT 1945 BY REFINED SYRUPS & SUGARS, INC.

WHAT YEAR WAS THIS?



THE Lincoln penny came out that year . . . and the hobble skirt. And the Hudson-Fulton Celebration opened in New York.

And it was the year the United Dressed Beef Company bought their first Mack Truck.

That was 1909, and the U. D. B. fleet has included Mack trucks ever since.

Significant, isn't it, that so many successful companies have used Mack Trucks for nearly half a century?

Significant—and perfectly natural. For the good judgment that builds good business is pretty sure to reach this conclusion about trucks: *Macks are the real workers.* Macks are the money savers, the money makers, the gilt-edge investment in trucks.

For confirmation, ask any Mack owner. For *proof*, get a Mack yourself.

★ *BUY THAT VICTORY BOND TODAY* ★

Mack Trucks, Inc., Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

Mack
TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

Performance Counts!

How to make Better Caramels

and increase production at lower cost!

"Our caramels are a lot better now"—"We've increased our caramel production and reduced cost at the same time." These and many similar comments come to us from leading confectioners who have added Staley's Soy Flour to their regular formulas.

For Staley's modern bland soy flour has several advantages as an added ingredient. Used as suggested it adds desirable flavor, improves texture, aids in the emulsification of fats, and increases shelf life.

Staley's Soy Flour is rich in proteins, contains important vitamins and minerals. Confectioners find they can increase the nutritional value of their candies appreciably by adding soy flour to their formulas.

The cost of Staley's Soy Flour is little more than that of the cheapest of other candy ingredients. The use of soy flour as an extra ingredient can increase production—and at the same time actually decrease cost. No extensive tests are necessary—adding soy flour results in no loss of valuable time.

A. E. STALEY MFG. CO.

Industrial Sales Division, Decatur, Illinois

STALEY'S HI-FAT SOY FLOUR

STALEY'S LO-FAT SOY FLOUR

Canadian Representative:
James L. Doig, 6876 Sherbrooke Street West, Montreal 28, Quebec, Canada

For these reasons, you may be interested in discussing the specific advantages to you of using Staley's Soy Flour in your formulas. If so, we'll be glad to work with you and recommend the type of soy flour that fits your particular needs best. Just send us the coupon below.

Even if you're not a confectioner, soy flour very probably has advantages to offer your industry. We'll be glad to discuss these advantages with you. There is no obligation. Just mail in this coupon.

A. E. Staley Mfg. Co., Dept FI-12
Decatur, Illinois

Please send me further information on the following uses of soy flour in candy making.

.. ..

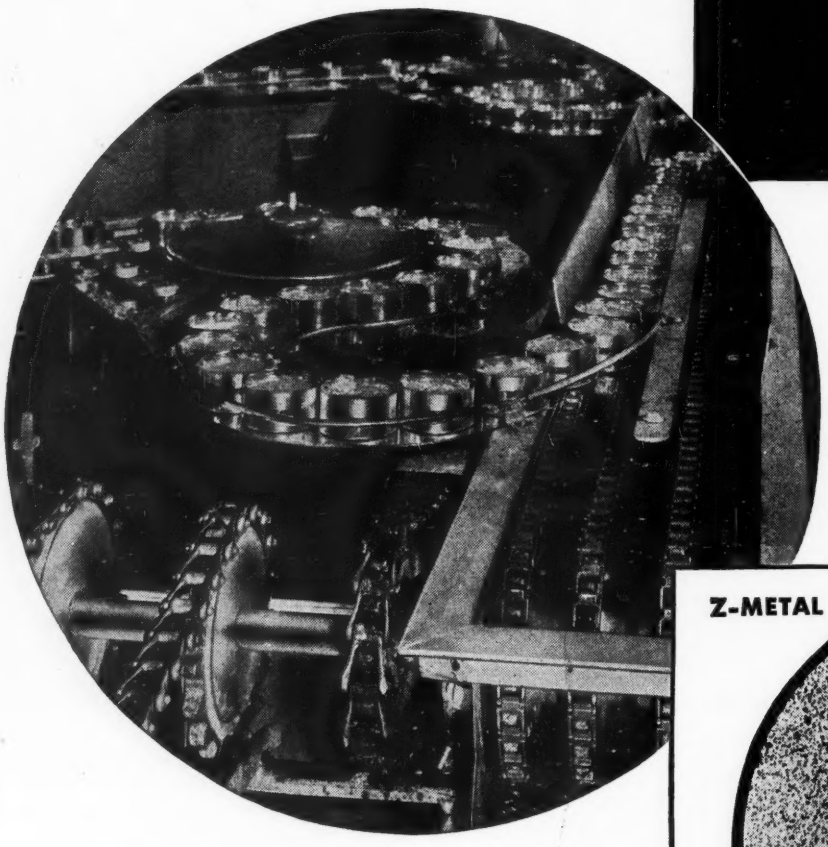
Name.....

Address.....

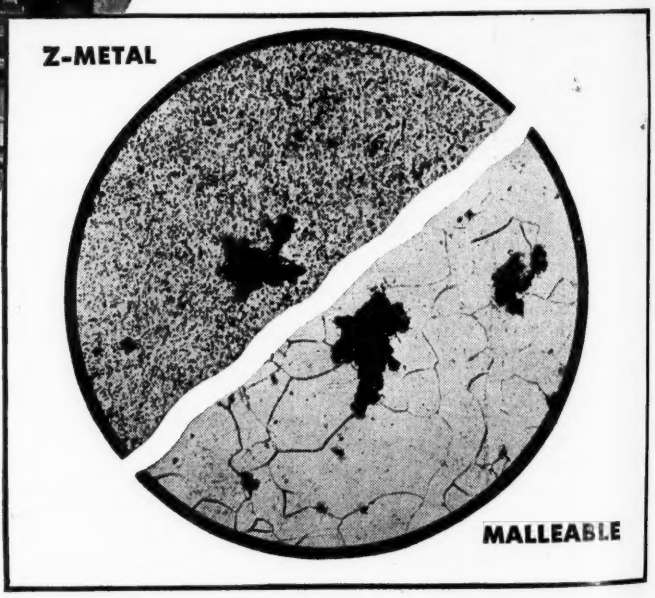
City.....*State*.....

THESE CANS TRAVEL *via* Superhighway

1 TRAFFIC JAMS, delays, interrupted production are unknown on this canning plant conveyor. Just like a modern superhighway system, the cans keep moving smoothly along—never jamming, never hesitating. Know why?



2 THIS CONVEYOR is made of Rex Z-Metal . . . the chain belt that's built to take it . . . to operate efficiently under moist or corrosive conditions. Ordinary chain would quickly corrode and fail if exposed to the corrosive action of fish slime, live steam and the other hazards of fish cannery service. But not Rex Z-Metal. It's a natural for canneries, bottling plants, packing and food processing.



3 THE EXCEPTIONAL QUALITIES of Rex Z-Metal are clearly demonstrated by this Photomicrograph (200 times magnification). It indicates the uniformity of Rex Z-Metal's grain structure. The small spheroidal particles in the Z-Metal are iron carbide. They and their relation to each other impart the greater strength and hardness to Rex Z-Metal. When you require high strength, corrosion and abrasion resisting qualities, get Rex Z-Metal chain belts.

* * *

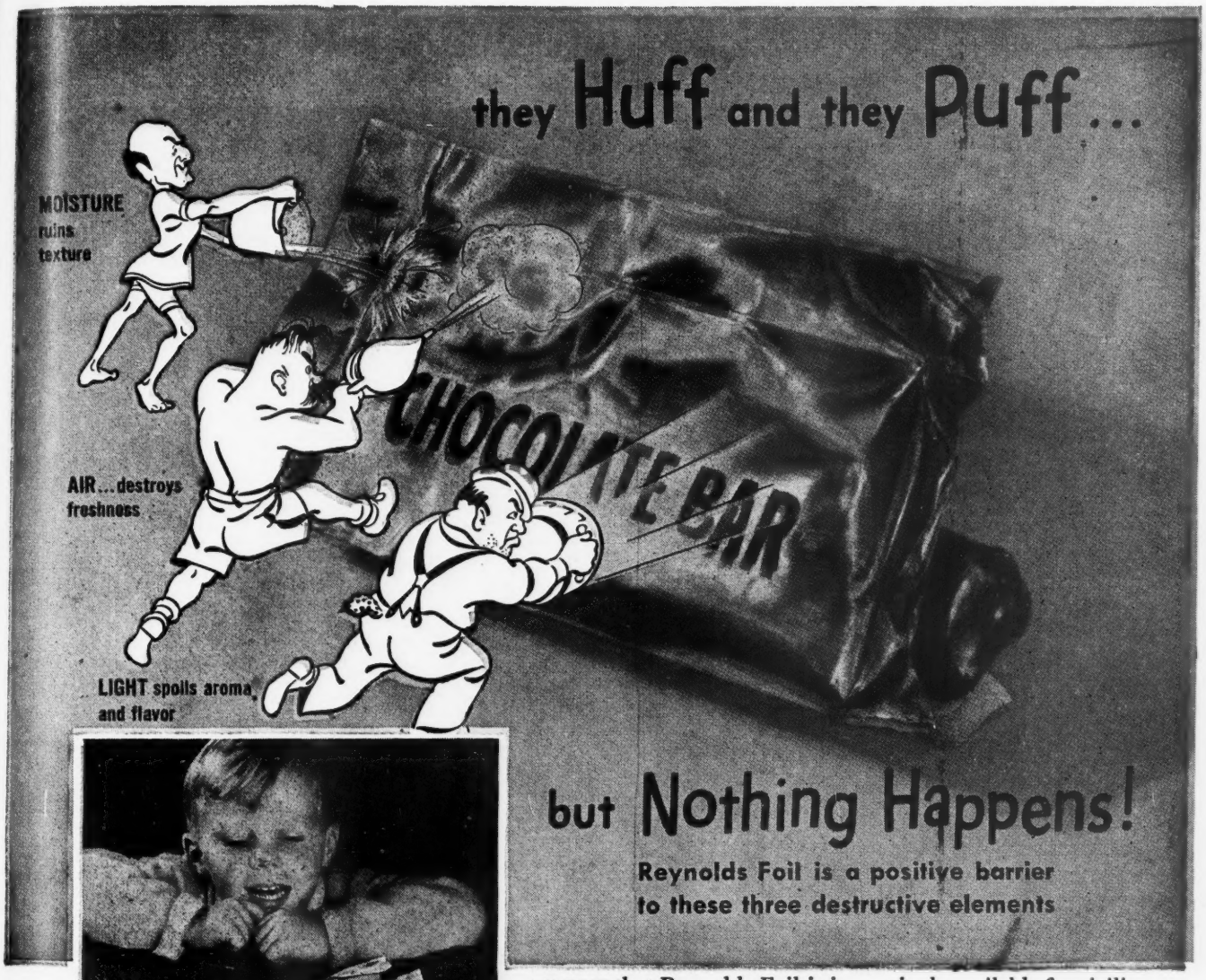
Rex Z-Metal chain belts are the answer to your conveyor problems involving heavy loads or corrosive conditions. The Rex Man can help you with your chain belt application problems. For complete information on Rex Z-Metal Chain Belts, write for your copy of Bulletin No. 437. Chain Belt Company, 1616 West Bruce Street, Milwaukee 4, Wisconsin.

REX **CHAIN BELTS**

Manufactured in every available type for the positive transmission of power, timing of operations and conveying of materials.

CHAIN BELT COMPANY OF MILWAUKEE

Rex Chain Belt and Transmission Division, Rex Conveyor and Process Equipment Division, Milwaukee 4, Wisconsin • Baldwin-Duckworth Division, Springfield 2, Massachusetts


they Huff and they Puff...
MOISTURE ruins texture
AIR...destroys freshness
LIGHT spoils aroma and flavor
but Nothing Happens!
Reynolds Foil is a positive barrier to these three destructive elements

Now that Reynolds Foil is increasingly available for civilian use, most of America's famous brands—candy, cigarettes, gum and foods are returning to foil-wrapped packages... the sure way to preserve freshness and flavor.

If you want to keep moisture *in*—aluminum foil will do it. If you want to keep moisture *out*—foil will do that too! Consult Reynolds—the world's largest rollers of foil.

Foil is light proof! Since light causes rancidity, many foods need foil's light-proof protection. Reynolds' wide experience with laminations, gauges, combinations of materials and four-color gravure printing is available for *your* product.

Rare, exotic flowers and fruits can now be flown from distant lands... and arrive fresh in temperature-proof Reynolds Frigichests. The Frigichest is double-lined inside with Reynolds Foil—another example of Reynolds Research in packaging.

Reynolds, for 25 years the resourceful and progressive leader in metal foil packaging, is now perfecting many new, revolutionary protective packages—new ways for Reynolds Foil to keep things fresher. Consider foil—consult Reynolds. Write Reynolds Metals Co., Richmond 19, Va.

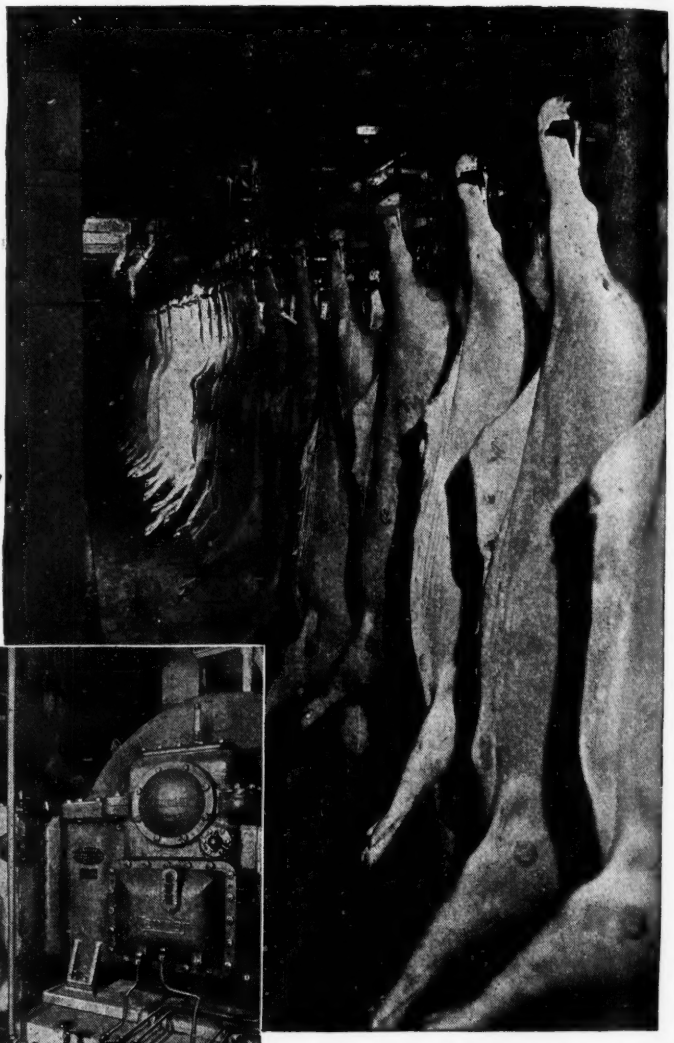
REYNOLDS FOIL

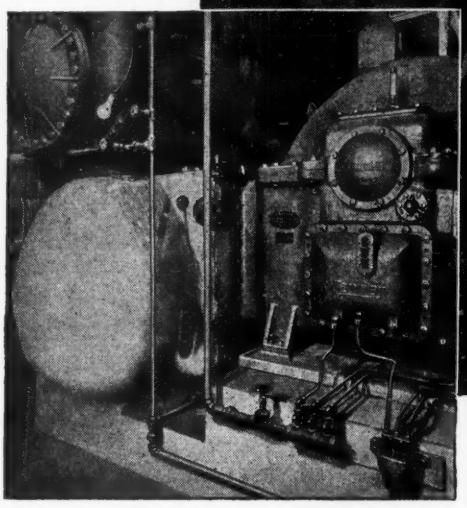
PURE ALUMINUM

THE FRESH-FLAVOR WRAP

Compact refrigeration unit helps packer maintain continuous production

—thanks to "FREON" safe refrigerants





View above shows section of hog cooling room in plant of Agar Packing and Provision Corporation. At left: compact Carrier centrifugal refrigerating machine.

HOW A progressive meat packing concern solved a refrigeration problem is well illustrated in the plant of the Agar Packing and Provision Corporation of Chicago.

Need existed for additional refrigeration to maintain low temperatures necessary for rapid and continuous production during hog-chilling operations. Only relatively small space was available for the purpose.

To meet requirements under existing conditions, a compact Carrier Centrifugal Refrigerating Machine was installed. Composed of four elements—compressor, condenser, brine cooler and a 550-h.p. steam turbine—the entire unit covers an area only 12′ x 16′ . . . ideally suited to the needs of the average slaughter house.

"Freon" safe refrigerants are used exclusively by the Agar Corporation. In speaking of this, J. J. Hewitt, Purch. Agent, writes: "During the last 14 months' operation in which we have had the Carrier machine in use, we have had no gas loss. Our engineers like to work with it due to its simple operation and safety features. By use of 'Freon,' we can maintain constant temperatures 24 hours a day regardless of load variations."

Whenever the need arises in your plant for new or additional refrigeration or air conditioning . . . or if you are planning postwar improvements along these lines . . . consult your architect or air conditioning engineer. They will gladly recommend dependable equipment. And to assure yourself of the advantages and safeness of "Freon" ask that specifications call for compressors designed to utilize "Freon," safe refrigerants. Kinetic Chemicals, Inc., Tenth and Market Sts., Wilmington, Del.

"Freon" safe refrigerants are widely used in heavy-duty refrigeration and air conditioning systems

KINETIC

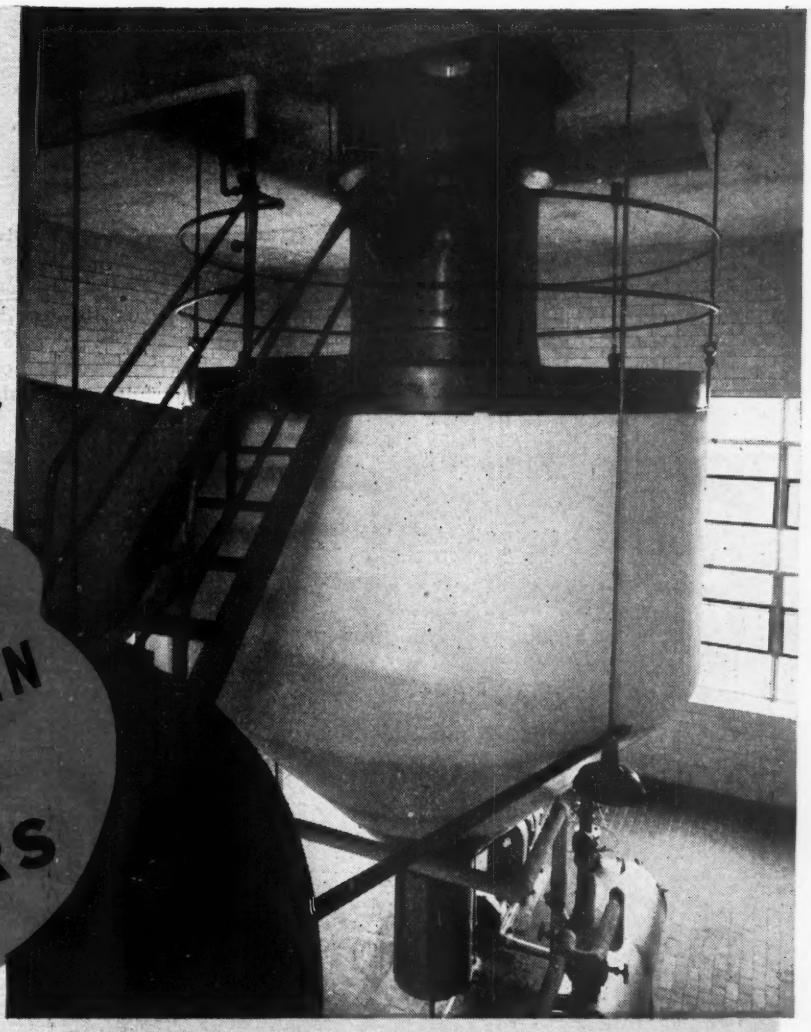
FREON *safe refrigerants*

REG. U. S. PAT. OFF.

"Freon" is Kinetic's registered trade mark for its fluorine refrigerants.

Now COFFEE *can be processed in*

SWENSON GRAY-JENSEN SPRAY DRYERS

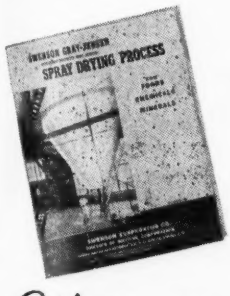


Swenson Gray-Jensen Spray Dryers have now been given the task of drying coffee—a process where preservation of *natural* appetite appeal is especially important. Careful investigation of the various drying methods led inevitably to the conclusion that Swenson Gray-Jensen Equipment would give the most satisfactory result.

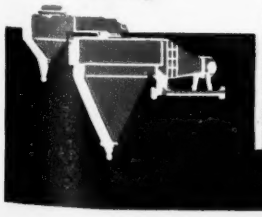
The reasons which motivated the choice of Swenson Gray-Jensen Equipment will be of special interest to those who contemplate drying other delicately flavored food products:

- The Swenson Process retains the original color, flavor, and aroma with its natural appetite appeal.
- The product has good texture and is readily soluble.
- Swenson multiple-stage drying provides full control of the moisture content, assuring excellent keeping qualities.
- The equipment is engineered for high operating efficiency, reducing the production cost of powder 10% to 15% as compared with other drying methods.
- Provision is made for complete sanitation . . . the equipment can be thoroughly cleaned and sterilized at the close of each operating cycle.
- Solids are totally recovered . . . there is no waste and no problem of fly material in the plant or neighborhood.

Bulletin D-100 gives full information on the operation of Swenson Gray-Jensen Spray Dryers—a copy will be sent on request.



Write for your copy today

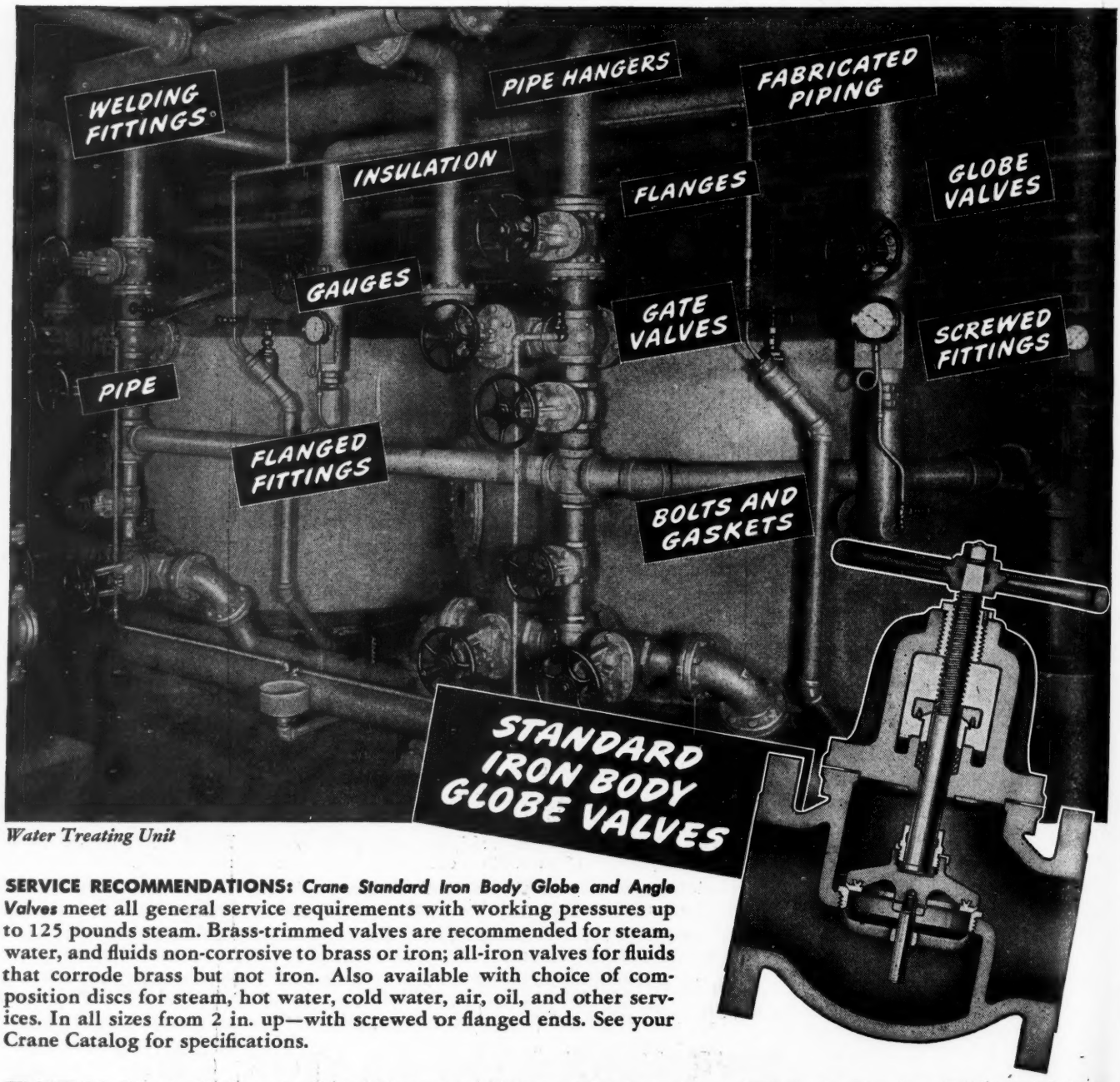


SWENSON EVAPORATOR CO.
DIVISION OF WHITING CORPORATION
SPRAY DRYER DEPARTMENT, 221-B N. La Salle St., Chicago 1, Ill.

For Piping Equipment . . . Any Kind . . . it Pays to Rely on CRANE

ONE SOURCE OF SUPPLY • ONE RESPONSIBILITY • ONE STANDARD OF QUALITY

Rebuilding piping systems . . . and keeping them at peak efficiency . . . is made a lot easier by using Crane *complete* piping materials service. One order—to your Crane Branch or Wholesaler—can cover *all* your valves, fittings, pipe, piping accessories and fabricated assemblies. You can choose from the world's greatest line of brass, iron, and steel equipment. One standard of quality in all materials—and one responsibility behind them—helps insure getting the best installation. At the same time, you get the benefit of Crane Co.'s 90-year experience. Below is an example of how one typical valve in the Crane line is applicable to many of your needs.



Water Treating Unit

SERVICE RECOMMENDATIONS: ***Crane Standard Iron Body Globe and Angle Valves*** meet all general service requirements with working pressures up to 125 pounds steam. Brass-trimmed valves are recommended for steam, water, and fluids non-corrosive to brass or iron; all-iron valves for fluids that corrode brass but not iron. Also available with choice of composition discs for steam, hot water, cold water, air, oil, and other services. In all sizes from 2 in. up—with screwed or flanged ends. See your Crane Catalog for specifications.

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. *Branches and Wholesalers Serving All Industrial Areas*

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

YOUR PRODUCT...

Plus improved enrichment . . .

means greater consumer acceptance!

Vi-Co

NATURAL "B" COMPLEX YEAST VITAMIN PRODUCTS AND YEAST DERIVATIVES

Plasmolyzed Yeast Extracts for FOOD and AMINO ACID Preparations

Through a greater knowledge of the value of better family nourishment, homemakers demand properly enriched foods. Do your products meet these demands? Are you enjoying maximum consumer confidence? Do your products have a real quality sales appeal?

The answer to these questions can be found in the use of Vi-Co Natural B Complex Yeast Products and Yeast Derivatives. Vico Products Company, pioneers in the manufacture of natural vitamin B complex extracts, produce them in various forms and can supply you the type most suitable for your particular product.

Vi-Co Plasmolyzed Yeast Extracts are prepared by enzyme digestion of brewers' yeast to yield a B complex product of high amino acids content. Amino acids provide the necessary "building blocks" for healthier and stronger bodies.

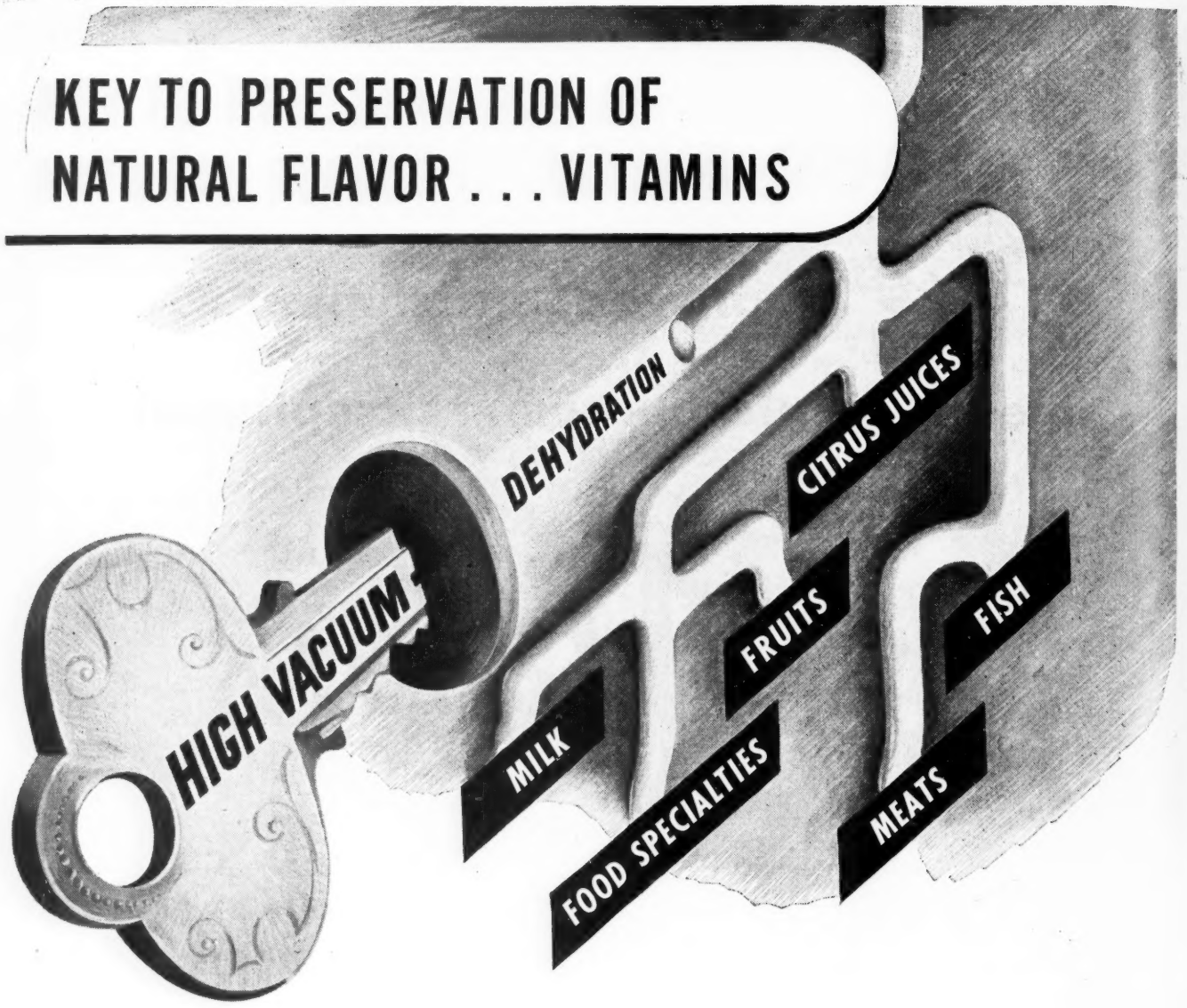
Vi-Co Plasmolyzed Yeast Extracts impart a "meat-like" flavor useful in fortifying soups, bouillon cubes, tomato juice and other packaged foods, thereby creating a greater demand for your enriched products.

WE INVITE YOU TO WRITE. Our technical staff can best advise you how Vi-Co Plasmolyzed Yeast Extracts and Natural B Complex Yeast Products and Derivatives can be used to enrich your own products.

VICO PRODUCTS COMPANY

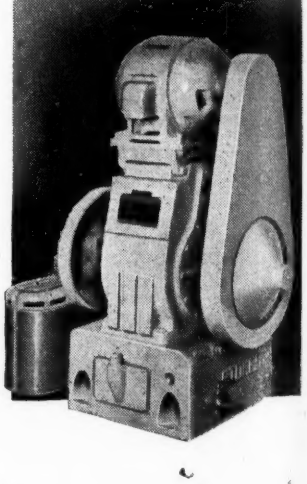
415 W. Scott Street, Chicago 10, Illinois

KEY TO PRESERVATION OF NATURAL FLAVOR . . . VITAMINS



Delicate flavors . . . complete vitamin content . . . natural goodness — all can now be captured by a new and amazingly effective method for dehydration and preservation of many food products.

The process is one of sublimation or "freeze-drying" under high vacuum at low temperatures. It is the same process used in developing the vast blood plasma and penicillin programs. Stokes pioneered and developed the equipment for this process — vacuum stills, dryers, pumps, gages . . . and by continuing research has adapted it successfully to the commercial processing of foods.



Citrus fruit juices, for example, are sublimed into the form of crystals . . . easily packaged and preserved. Replacing the water that has been removed, instantly reconstitutes the juices . . . juices in which are retained all the delicate flavors and vitamins and food values of the tree-ripened fruits. With meats, shell fish, fruits, tomato juice, coffee, extracts, milk and food specialties, freeze-drying has proved equally successful.

Stokes' 40 years of experience in the field of high vacuum, plus a wealth of new research knowledge on sublimation, offer food processors a rich source of help in planning for tomorrow's market.

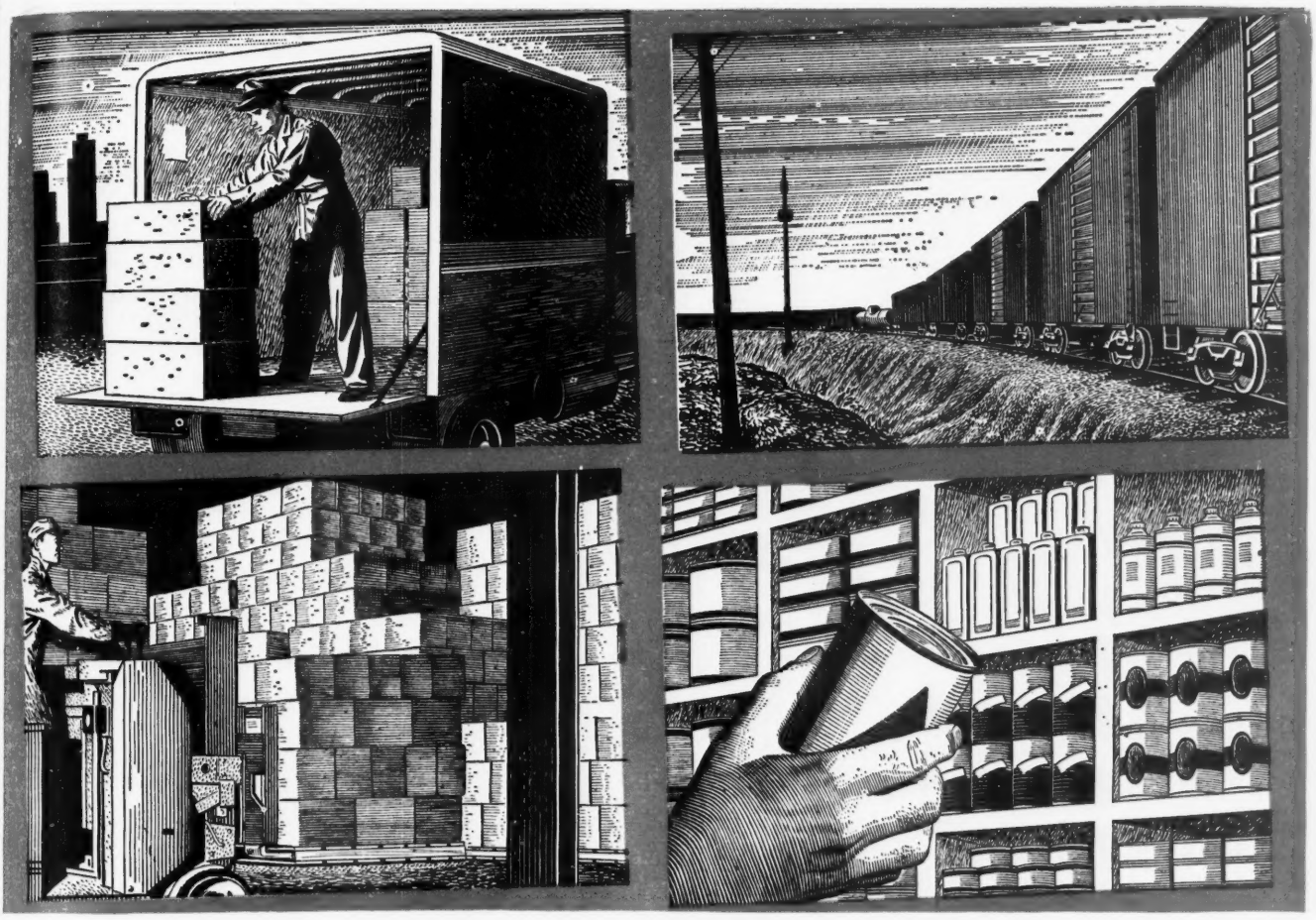
Investigate High Vacuum now! Write to F. J. STOKES MACHINE CO., 5976 Tabor Road, Philadelphia 20, Pa.

50th year of Service to Industry

F.J.Stokes *High Vacuum*

FJS Est. 1895

PUMPS · GAUGES · EQUIPMENT



How a Piece of STEEL and a Little TIN Save You VALUABLE SPACE!

● On trucks and trains . . . in warehouses . . . on busy retail shelves . . . space costs money. But you can cut down those space costs by packaging your food products in compact steel-and-tin *cans.*

Yes, steel-and-tin cans . . . which are more than 98% steel, less than 2% tin . . . are real space-savers because they can be safely shipped in low-cost, non-compartmented cartons, efficiently stacked in minimum storage space, and effectively used in any kind of point-of-sale display. And for high-speed food packaging operations— free from danger of jamming "on the line"— you can't beat durable trouble-free cans.

What's more, your customers like food products packaged in shatterproof cans. They know they can rely on metal packaging to seal in the freshness, flavor and nutritional values of your food products. So, for perfect packaging protection and all-round space economy, package your food products in economical steel-and-tin *cans.*

Real Packaging "Know How" Calls for Food Products in Cans

1. Cans don't break, split or tear.
2. Seal out light, air and moisture.
3. Cans are economical to store and ship.
4. Cans are light, compact . . . save shelf and storage space.
5. Labels can be permanently lithographed on cans.

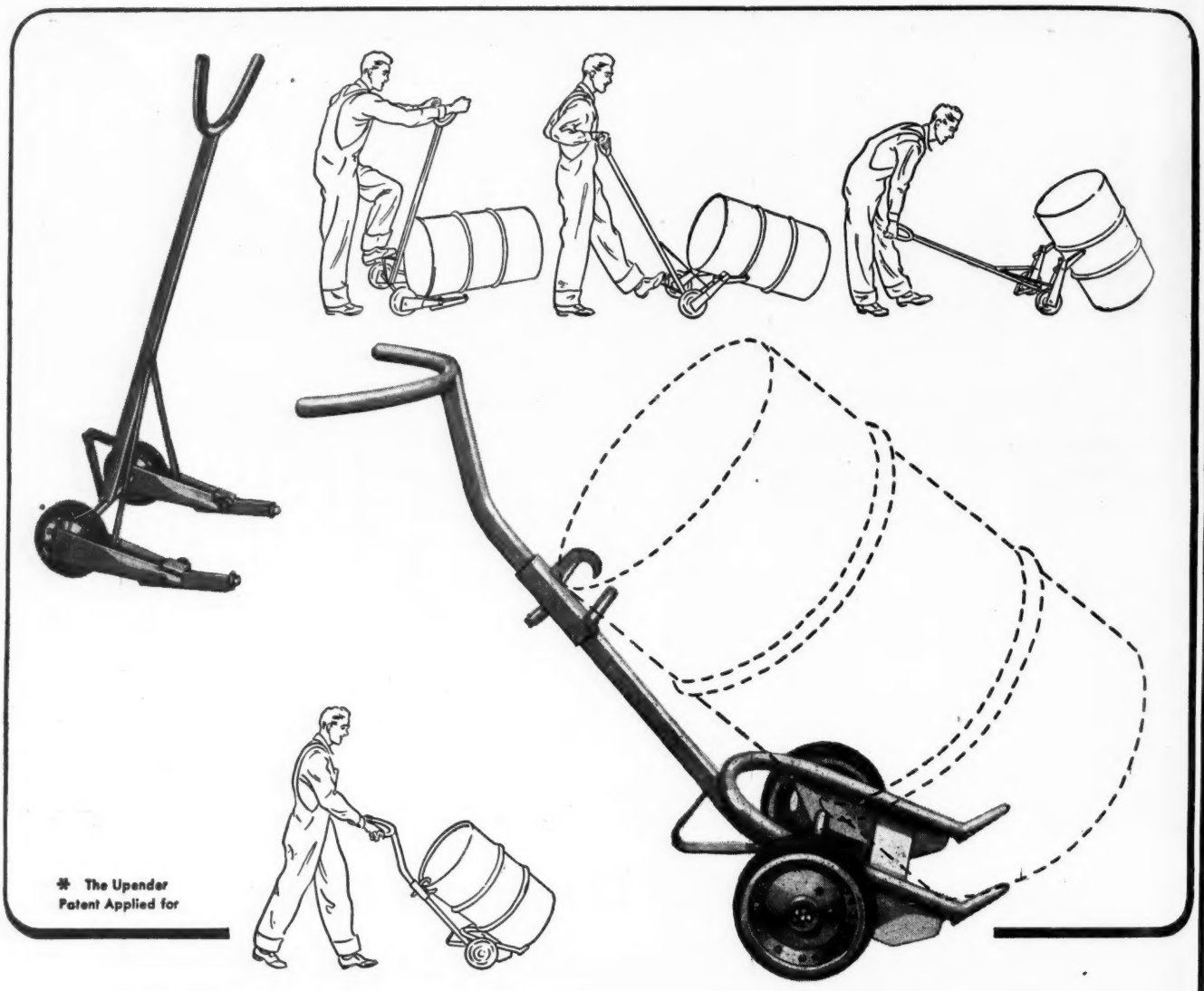
Promoting *Cans* from Coast to Coast

Full-page, full-color advertisements are bringing the story of the advantages of buying merchandise packed in cans right into the homes of America's consumers. More than 32,000,000 of these informational advertisements will appear in the nation's favorite magazines and the magazine sections of Sunday newspapers this month.

It's more than 98% steel, less than 2% tin

CAN MANUFACTURERS INSTITUTE, INC., NEW YORK

NO OTHER CONTAINER PROTECTS LIKE THE CAN



A TEAM that makes handling heavy barrels and drums A ONE MAN JOB

Wartime Products

Battery Carts
Engine Transportation Cradles
Crew Chief Maintenance Stands
Portable Field Shelters
Oxygen Service Trailers
Towing Assemblies

For production achievement

The Colson Universal Drum Truck and the Colson *"Upender" provide a team typical of the way Colson materials-handling equipment increases the effectiveness of manpower.

With the Drum Truck no lifting of drums or barrels is necessary. For minimum strain on the operator, the load is properly balanced over the wheels. The worker only pushes the truck.

For upending a drum or barrel, the Colson "Upender" does the job. With the long handle as a fulcrum, the operator merely pushes the "Upender" under the drum or barrel, quickly and safely placing it into position to be transported on the Colson Universal Drum Truck.

Colson equipment will aid you in cutting production costs. We'll be glad to discuss your materials-handling problems and suggest the Colson products best fitted to your needs.

THE COLSON CORPORATION

ELYRIA, OHIO

CASTERS • INDUSTRIAL TRUCKS AND PLATFORMS • LIFT JACK SYSTEMS • BICYCLES • CHILDREN'S VEHICLES
WHEEL CHAIRS • WHEEL STRETCHERS • INHALATORS • TRAY TRUCKS • DISH TRUCKS • INSTRUMENT TABLES

"WHITE Upper Walls and Ceilings Reflect the Maximum Amount of Light . . ."

SAYS LAROS

R. K. LAROS SILK COMPANY
BETHLEHEM PENNSYLVANIA

September 7, 1945

U. S. Gutta Percha Paint Company
Providence
Rhode Island

Gentlemen:

In the manufacture of our product, we have always believed that good plant housekeeping reflects itself in the quality of the goods produced. Paint plays an important part in our housekeeping program.

Interiors which reflect light properly add to the efficiency and the attractiveness of a plant. White upper walls and ceilings reflect the maximum amount of light, whether the source of light is artificial or natural.

We have always considered Barreled Sunlight the ideal paint for upper walls and ceilings. For the past twenty-five years, we have been users of your product because it does the job for which it is intended.

Very truly yours,

R. K. LAROS SILK COMPANY

Jerome Barney
Superintendent

JB:LL

SINCE Laros Lingerie is nationally known for its excellent quality, it is not surprising that its manufacturers believe quality begins with "good plant housekeeping", and that WHITE paint plays an important part in their housekeeping and efficiency program. The Laros letter herewith reiterates a fact which has been known by lighting engineers for years: namely, that paint and light are *partners* in creating good seeing conditions and hence, in increasing production.

A good WHITE paint of lasting whiteness is best for ceilings and walls because it has maximum reflectivity, eliminates glare and gloomy shadows through proper *distribution* of light over the whole working area, and gets the most out of both natural and artificial light.

Our booklet, "Color for Industry", tells more about the partnership of Light and Paint in promoting and prolonging the efficiency of your workers. Send for a free copy of this helpful booklet TODAY.

DATE.....

U. S. GUTTA PERCHA PAINT CO.
37-L Dudley St., Providence, R. I.

Please send us, without charge or obligation, a copy of your 16-page illustrated booklet entitled "Color for Industry".

COMPANY.....

STREET AND NUMBER.....

CITY.....STATE.....

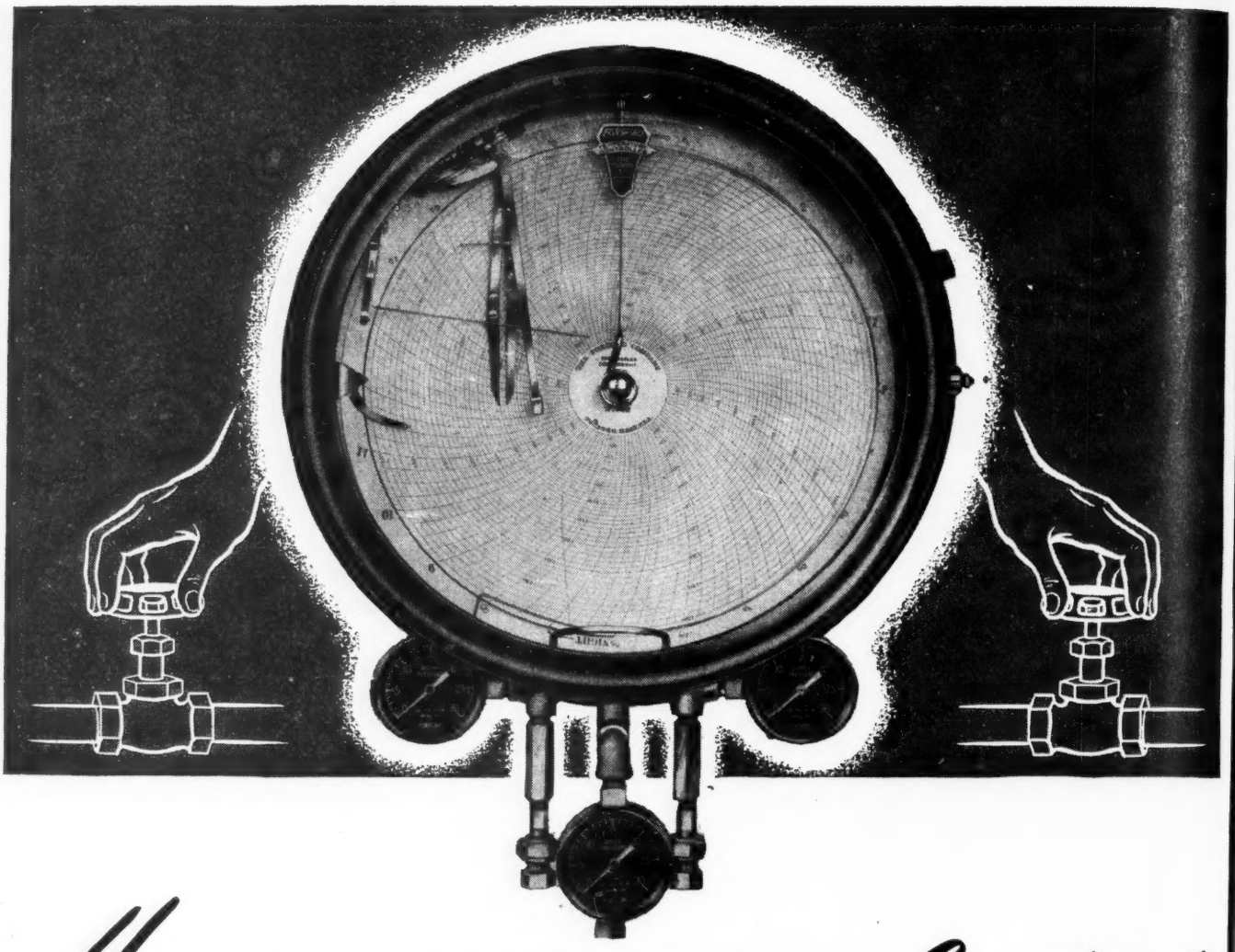
ATTENTION.....

TITLE.....

BARRELED SUNLIGHT

SPECIALISTS FOR NEARLY FIFTY YEARS

IN MAINTENANCE PAINTS FOR INDUSTRY



Here's "AMBIDEXTROUS" *Control*

THAT AUTOMATICALLY OPERATES TWO VALVES!

Wherever process temperature, pressure or humidity must be controlled by adjustments of two valves, the Foxboro Duplex Controller gives you two dependable, accurate "hands" that need no supervision. It combines 2 single-action valve control systems actuated by a single measuring system.

All you need to do is set the "high" and "low" indicators at desired points. The controller automatically "manipulates" one valve if the process condition reaches the high point; or the other valve at the low point.

What's more, both adjustments may be definitely fixed at specified degrees, percentages, or pounds-per-square-inch to maintain an exact differential between high and low points.

Typical advantageous uses of Foxboro Duplex Controllers are listed in the panel. Detailed information on their application to your problem may be obtained by sending a description of your process. Write **The Foxboro Company, 30 Neponset Ave., Foxboro, Mass., U. S. A.** Branches in principal cities.

TYPICAL APPLICATIONS

1. **Dough Rooms, Proof Rooms** – for temperaure or humidity. A Duplex Controller automatically controls both the heating and cooling valves, or the humidifying and de-humidifying valves.
2. **Glass Packing** – for pressure. Duplex Control maintains accurate pressure by automatic adjustment of both intake and exhaust valves.
3. **Smoke Houses** – for humidity. One "hand" of the Duplex Controller operates steam spray valve; the other adjusts the damper.
4. **Air Conditioning**–Without supervision, Duplex Control accurately and automatically controls heating in winter and cooling in summer.

FOXBORO
REG. U. S. PAT. OFF.

DUPLEX CONTROLLERS

Put A Stop To EXCESSIVE M.V.T. with KELLER-DORIAN *functional packaging papers*

MOISTURE VAPOR TRANSMISSION is the greatest obstacle in the packaging of a wide range of products. Keller-Dorian functional packaging papers offer a solution to this problem of keeping moisture where it belongs, by controlling M.V.T. up to 1.3 grams.

This works two ways. In packaged meats, vegetables and fruits the proper amount of moisture is kept *in* to help retain flavor, keep contents from dessication. In other packaging applications K-D functional paper keeps moisture *out*, prevents rust, corrosion or spoilage. And this can be accomplished, in many cases, with only a *single* wrap!

If you are looking for greaseproof, non-cracking, easily handled packaging papers designed for functional service in many fields, get in touch with Keller-Dorian. We will send samples or furnish experienced counsel without obligation.

KELLER-DORIAN
CORPORATION
Empire State Building
New York 1, N. Y.

FUNCTIONAL PACKAGING PAPERS *for Protecting Perishable Products*

A MAN WELL WORTH KNOWING

Your Local **Gas** *Company's*

Industrial Engineer

The Gas Industry is one of the most progressive and forward looking servants to American homes, and to industrial and commercial establishments. The benefits of the research and developmental work of the American Gas Association and Gas equipment manufacturers are made available to you by trained, skilled representatives of your local Gas Company who are available for consultation on any problem which Gas can help solve.

If you are an executive, an engineer or a production man of a manufacturing company using industrial heat and are interested in the economical, speedy manufacture of your company's products, you should become acquainted with the Industrial Engineering Staff of your local Gas Company. Each of these men is an expert in modern applications of heat.

He has had long experience. He has had a versatile training. He may be a keen salesman but he is also a sound engineer. He is interested in economy, better products, plant cleanliness, improved working conditions and is an authority on automatic heat control. He has a wealth of information, based on solid research, at his command.

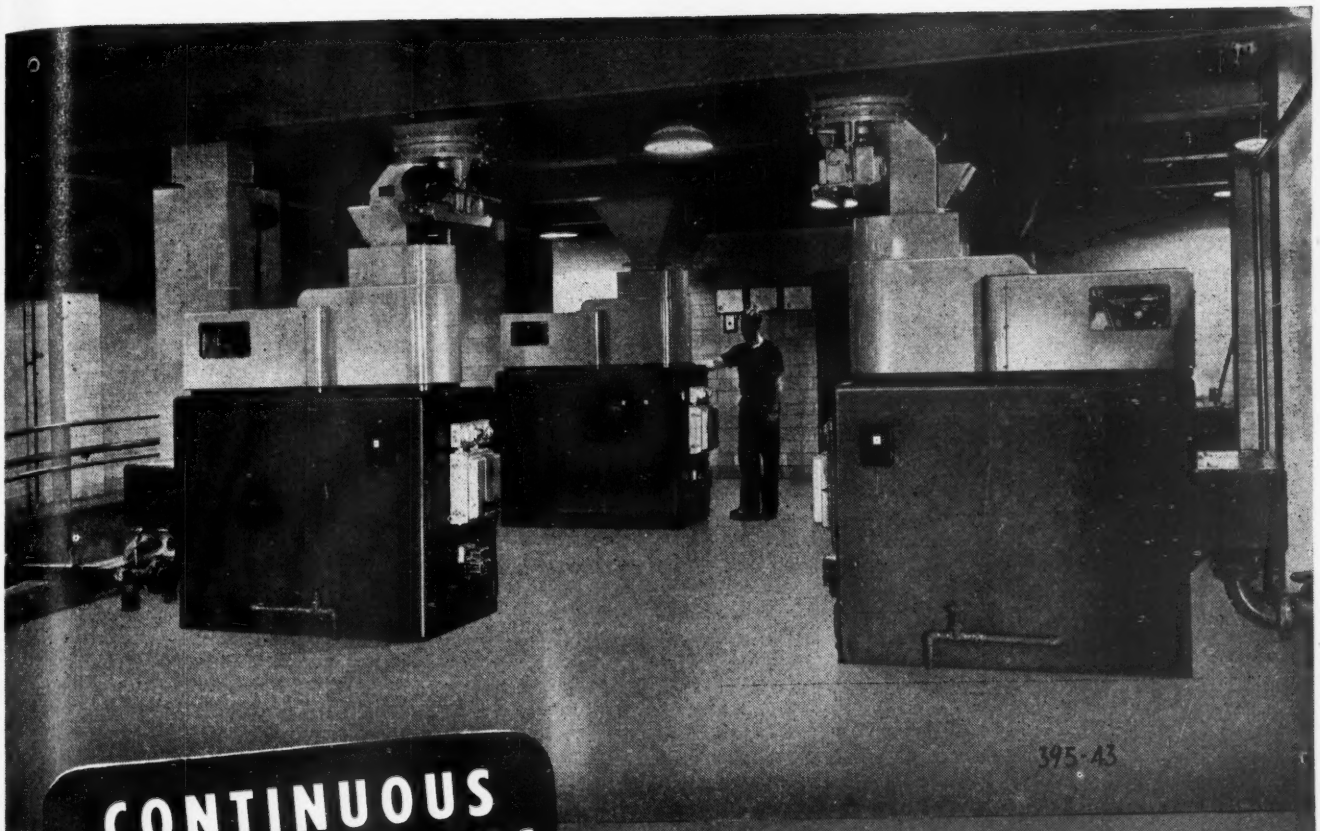
You get the best advice on the most worthwhile equipment for your specific heat processing jobs. So, if you have use for industrial heat in any form, make the acquaintance of your local Gas Company's Industrial Engineer. It costs you nothing —it will pay you dividends.

THE TREND IS TO GAS

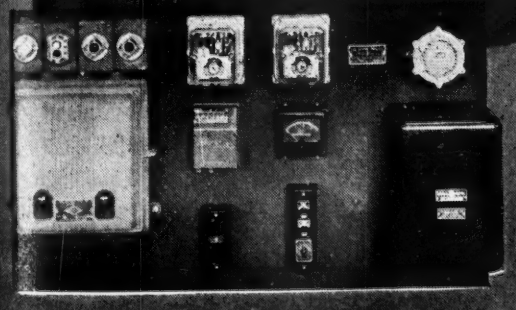
FOR ALL
HEAT PROCESSING OF FOODS

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.



CONTINUOUS PROPORTIONING *by* REMOTE CONTROL



This group of Jeffrey-Traylor Waytrols automatically proportions various ingredients. Such equipment is adaptable to most kinds of materials.

The remote control panel board has an automatic alarm, klaxon, tonnage indicator and push buttons to increase or decrease capacity.

If desired, tonnage indicator can be equipped to furnish a printed weight record.

JEFFREY

ESTABLISHED 1877

CHANCES are you've already started planning new products, or new packages for familiar products, for her.

For she's your postwar consumer—and she's expecting a lot from postwar merchandising and manufacture.

But in your effort to please her—don't overlook her other sides . . .

Her eyes and her purse...

Will your product be packaged to attract her attention? Will she reach for your package because it looks exciting and different?

And will your packaging and manufacturing methods keep your prices low enough for her budget?

Why not let us help?

In our wartime work for Uncle Sam we developed many interesting angles on packaging. We'd like to share them with you.

Besides this, our 44 years of packaging experience—and our extensive research facilities—are at your service. Finally, our wealth of experience in label design and lithographing is at your disposal.

Get in touch with our nearest representative today—or write to us direct.

World's Largest manufacturers of FIBRE and METAL containers

AMERICAN CAN COMPANY

230 PARK AVE, NEW YORK 17, N.Y.

CANCO

O.K. of a Great Critic...

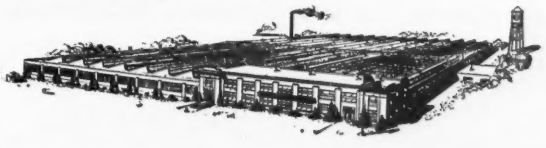
A WHOLE PLANTFUL OF THEM WHO BUILD MOTORS TO SATISFY EXACTING BUYERS!

Other plants may turn out *more* motors than the Star Plant. But you'll find no *better* motors . . . for when you see the Star Trademark you see the "O.K." on the efforts of hundreds of meticulous craftsmen working to critical standards.

Among them are the men who own the company. For Star's owners are born motor men, and the place to find them is out in the plant or around a drawing board, helping to make Star Motors as good as they can be.

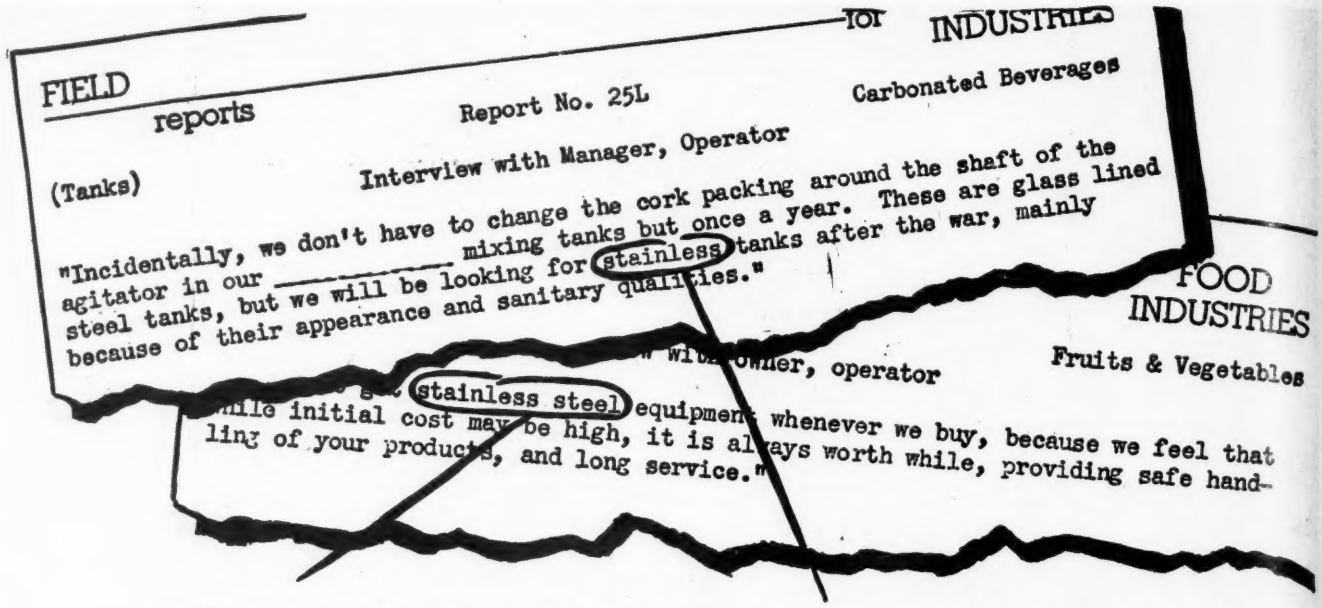
Everybody at Star is exacting about quality . . . in design, materials, workmanship. There's a craftsman's spirit everywhere that words can't cover. But motor buyers who visit us always comment on it. And exacting motor users recognize that Star does things a bit better by specifying Star where a motor must be better than "good enough".

WRITE FOR 8-PAGE DIGEST. It outlines Star Motors (⅛ to 200 HP) and Generators (to 150 KW) . . . names hard-to-satisfy buyers who are long-time customers . . . tells how Star becomes the "Motor Department" for customers. Star Electric Motor Co., 238 Bloomfield Ave., Bloomfield, New Jersey.



STAR MOTORS

POWER PACKAGED AS YOU NEED IT


FIELD reports for FOOD INDUSTRIES
Report No. 25L
Carbonated Beverages
(Tanks)
Interview with Manager, Operator
"Incidentally, we don't have to change the cork packing around the shaft of the agitator in our _____ mixing tanks but once a year. These are glass lined steel tanks, but we will be looking for stainless tanks after the war, mainly because of their appearance and sanitary qualities."
FOOD INDUSTRIES
Fruits & Vegetables
stainless steel equipment whenever we buy, because we feel that
initial cost may be high, it is always worth while, providing safe hand-
ling of your products, and long service."

FOOD INDUSTRIES REPORTERS FIND PLANS FOR PLANTS STRESS STAINLESS

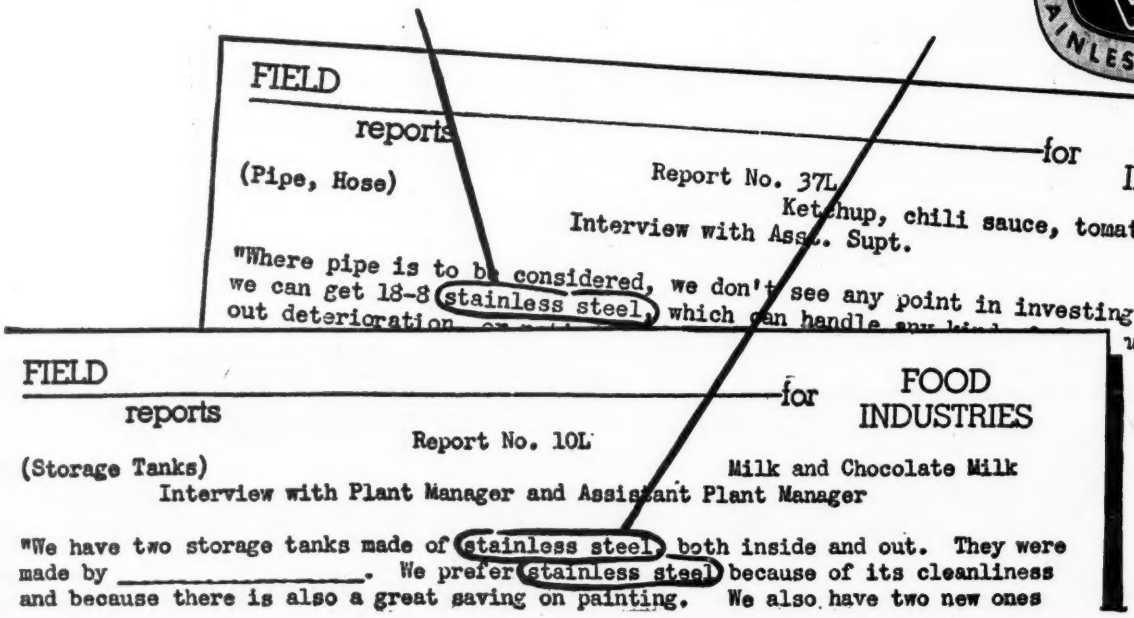
Through interviews of its field reporters with food-plant managers from coast to coast, *Food Industries* magazine maintains a continuing study of trends in the industry. Reproduced here are a few excerpts from these reports. They indicate that executives are definitely planning for more stainless steel equipment in their plants.

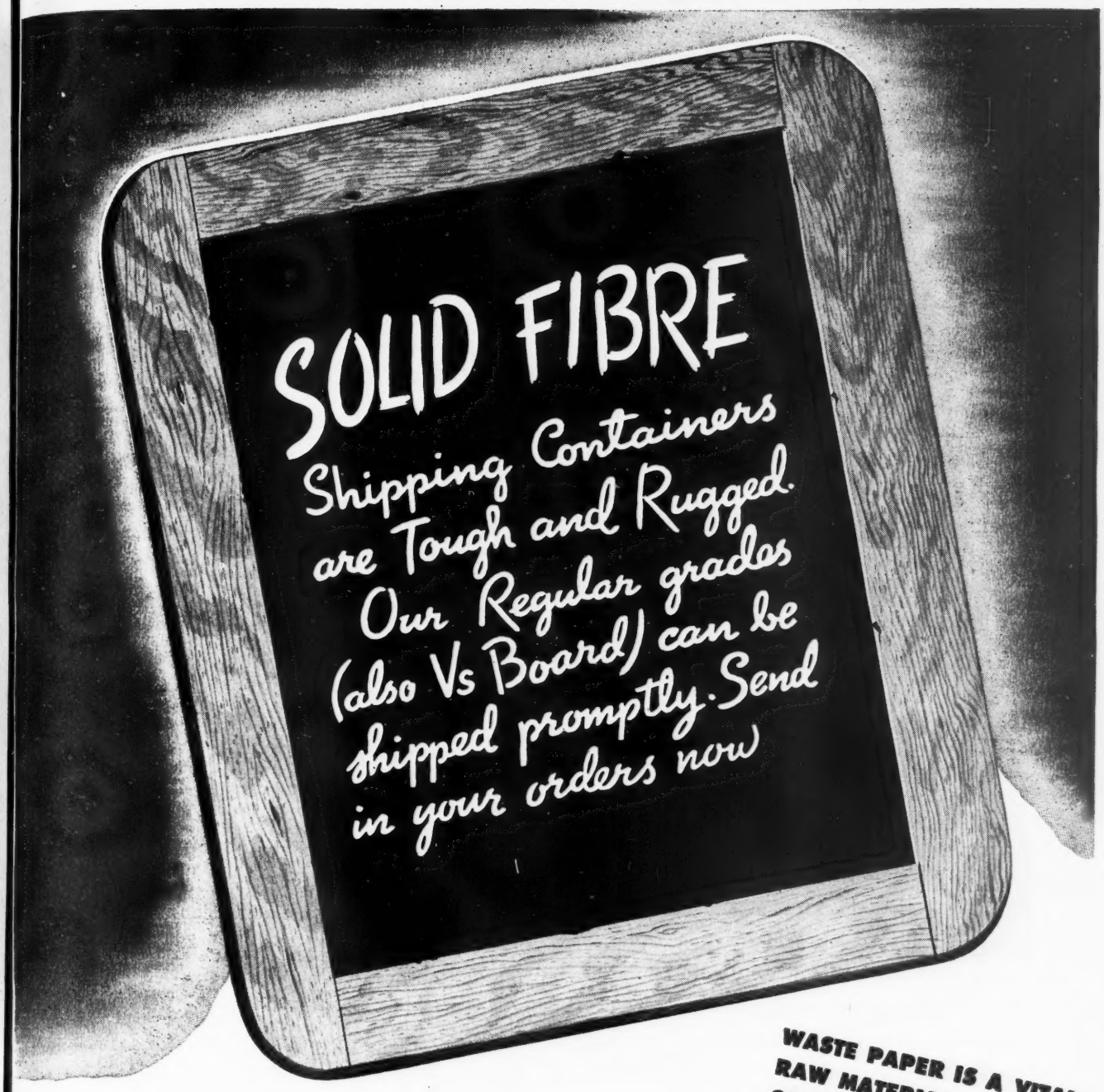
These plant men know the advantages of stainless from long experience. They accept its sanitary qualities, its corrosion resistance and great strength, and its inviting appearance which makes such favorable impressions on visitors.

You'll find, too, that equipment made of ARMCO Stainless Steel protects the flavor and appetizing color of your products. It is magically easy to clean and keep clean, will not harbor bacteria, and is unaffected by sterilizers. Being rustless, there is practically no maintenance cost. It helps keep profits up.

ARMCO Stainless equipment belongs in your plans for improvements. While the initial cost is higher than for ordinary shorter-lived materials, this bright, solid, rustless metal will pay for itself several times over before the equipment needs replacing. The American Rolling Mill Company, 2351 Curtis Street, Middletown, Ohio. Export: The Armco International Corporation.

THE AMERICAN ROLLING MILL COMPANY • Special-Purpose Sheet Steels


FIELD reports for FOOD INDUSTRIES
(Pipe, Hose)
Report No. 37L
Ketchup, chili sauce, tomato juice, etc.
Interview with Asst. Supt.
"Where pipe is to be considered, we don't see any point in investing money unless we can get 18-8 stainless steel, which can handle
out deterioration
material with-
FIELD reports for FOOD INDUSTRIES
Report No. 10L
(Storage Tanks)
Milk and Chocolate Milk
Interview with Plant Manager and Assistant Plant Manager
"We have two storage tanks made of stainless steel, both inside and out. They were made by _____. We prefer stainless steel because of its cleanliness and because there is also a great saving on painting. We also have two new ones



WASTE PAPER IS A VITAL RAW MATERIAL FOR CONTAINERS . . . .
Save it . . . .

THE essential ruggedness and toughness of *Solid Fibre,* wet or dry, were amply demonstrated during the war. If there is any chance of your shipment getting wet or being subjected to high humidity for long periods, protect it with *Solid Fibre* . . . If rough handling and abuse can be expected, *Solid Fibre* can take it . . . For carrying heavy loads requiring a container of great strength, again it's *Solid Fibre.* We can now furnish for civilian uses our well known Solid Fibre Containers and the several grades of Vs Board Containers.

HUMMEL & DOWNING CO. *Milwaukee 1, Wis.*
MAKERS OF SOLID FIBRE AND CORRUGATED CONTAINERS — FOLDING BOXES — BOXBOARD

From Stratosphere Battlegrounds to Your Plant . . .

New, Sensationally Hard Aluminum Alloy for Wear-Ever Equipment!

From the same laboratory that created extra strong aluminum alloys for America's warplanes comes this new, tough aluminum alloy for Wear-Ever equipment. It's harder than any ever before practical, and is being used in everything from the smallest Wear-Ever items to steam jacketed kettles.

NEW-LOOKING OVER THE YEARS

This new alloy offers amazing resistance to denting, gouging and scratching. You'll like the way Wear-Ever products, made from it, retain their shape indefinitely . . . while the Smoothard finished surface keeps them smooth as new for years.

OTHER ADVANTAGES

Every Wear-Ever piece is designed for easier, better processing. This includes generously rounded corners for quick, thorough cleaning, sturdy finger-fitting handles for safe handling, plus extreme toughness and resistance to corrosion for *even higher* standards of cleanliness.

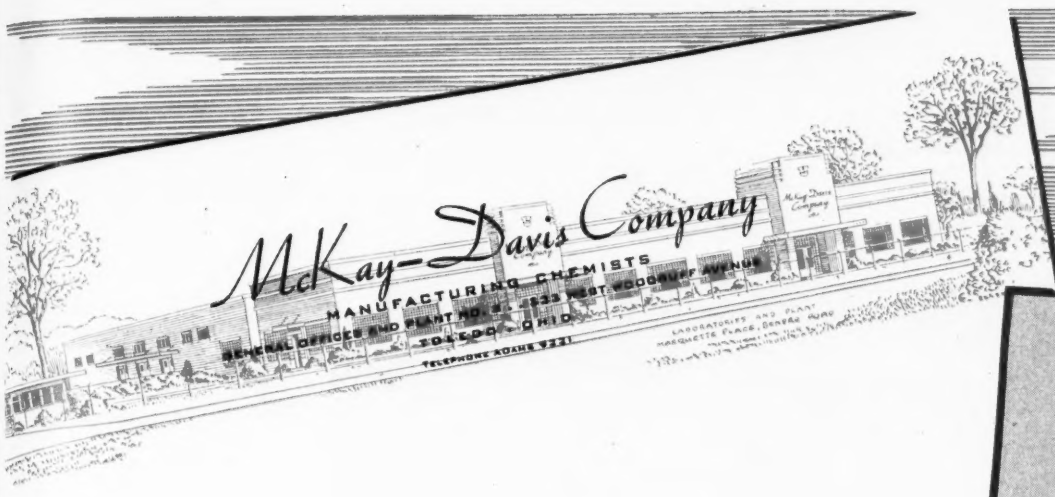
WRITE TODAY

Plan now to use Wear-Ever equipment—made from the new, sensationally hard aluminum alloy. Write for complete information today to The Aluminum Cooking Utensil Company, 312 Wear-Ever Building, New Kensington, Pa.

Made of the metal that cooks best . . . easy to clean

Now... MORE WEAR THAN EVER IN—

WEAR-EVER ALUMINUM


McKay-Davis Company
MANUFACTURING CHEMISTS
GENERAL OFFICES AND PLANT NO. 2 - 333 WEST WOODRUFF AVENUE
TOLEDO - OHIO
TELEPHONE ADAMS 9221

To My Friends in the Processed Food Industry:

It gives me great pleasure to announce that during the past eighteen months I have been associated with the McKay-Davis Company, Toledo, Ohio. McKay-Davis has recently completed a huge production program for the United States Army. Altogether we produced and packaged nearly one and one-half million pounds of McKay's Vegetable Bouillon. This product was put up in 10-Gram cellophane and aluminum foil envelopes, packed one thousand to a case, and was then shipped to other firms who specialized in assembling the "K" Ration. Yes, McKay's Vegetable Bouillon served too, as an essential component of the famous Army "K" Ration Emergency Kit.

Now, as Technical Director of McKay-Davis' Food Division, I look forward to the renewal of acquaintanceships severed as a result of war-time conditions and the cultivation of new friends in the food processing industry. Our entire organization is preparing now to serve humanity in peace-time with the same rigorous emphasis on cooperation among ourselves and with our customers that made McKay-Davis a name familiar on all war fronts.

McKay-Davis' Food Division is proud of its organization for the production and distribution of dehydrated food specialities. Soon we will offer McKay's Vegetable, Vegetable-Beef and Chicken-Style Bouillons to the trade. We are also manufacturing an excellent Soya Sauce for those who demand quality. Besides these leader items we expect to feature a new line of seasonings and sauces which are now in the development stage.

Our manufacturing and packaging facilities are designed to assure the utmost in sanitation. We use stainless steel equipment throughout our plant, and an ultra-modern control and research laboratory safeguards the purity, quality and uniformity of each production batch. Our plant possesses the unique feature of humidity and temperature control in both the manufacturing and packaging spaces. Furthermore, we have a streamlined tablet production department at the disposal of our customers.

With best regards, as always, I am

Sincerely yours,

McKAY-DAVIS COMPANY

Lewis J. Minor

Lewis J. Minor
Technical Director
Food Division

McKay-Davis Company
333 West Woodruff Avenue
Toledo 2, Ohio

LJM:tn

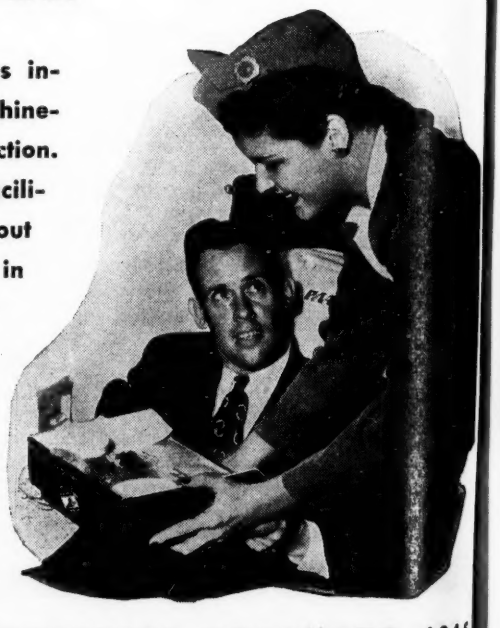
Freshness that's packed for travel

● **A mile up on the Alaska route or over the humid jungles of South America, Pan American World Airways' passengers enjoy meals kept fresh and appealing in Dobeckmun cellophane bags. Even the silver service is individually cellophane-wrapped to carry out the "public be pleased" attitude.**

Such smart packaging adds a touch of good will and customer comfort to the important job of protecting traveling foods—on plane trips or on the long haul from plant to platter.

Other air-tight, moisture-tight, odor-proof Dobeckmun packages include "Tritect" laminated cellophane bags, attractively printed machine-applied film overwraps, and "Metalam" laminated foil for extra protection.

For tested packaging ideas, Dobeckmun technical and research facilities are at your service. Write for samples and suggestions, without obligation. The Dobeckmun Company, Cleveland 1, Ohio. Branches in Boston, Chicago, Cincinnati, Los Angeles, New York, Philadelphia, San Francisco and Seattle. Representatives everywhere.



DOBECKMUN

SELF-SELLING PACKAGES IN PROCESSED FILMS AND FOILS

You Can Become A Charter Member of the Best Informed Audience in the World . . .

An exciting new world is in the making — out of the developments of science — before our very eyes.

Every thinking American wants to know HOW these amazing achievements will shape the pattern of his present and future life.

Starting in April, 1946, McGraw-Hill will publish a thrilling new non-technical general magazine that will interpret, month by month, the impact of the scientists' world-shaping *as it happens*.

MEET A NEW AND DIFFERENT MAGAZINE

The job that SCIENCE ILLUSTRATED has set for itself has never been done before.

The need for such a magazine has long existed but the *demand* was never as pressing . . . the American public was never as inquisitive minded . . . as science-hungry . . . as deeply conscious of impending changes in our social and economic life as it is today.

SCIENCE ILLUSTRATED will cover the broad fields of science, invention, mechanics and discovery. It will discuss the new challenges and opportunities that are coming out of radar, the heady secret of the atom, and the amazing, world shaking advancements in communication and transportation.

It will interpret, for the progressive thinking layman as well as for the business man, the great new triumphs in drugs, medicines, chemicals, metallurgy, textiles, fabrics, food processes, materials, methods, procedures – the entire range of scientific achievement – in terms of their contribution to better living.

SCIENCE ILLUSTRATED will *report, interpret,* and *project!* It will be fast and fascinating reading – a thrilling new magazine for an exciting new world! In its pages, month after month, the products, developments, and horizons of scientific achievement will come alive in terse, sparkling text and dramatic colorful pictures.

The subjects discussed in SCIENCE ILLUSTRATED will be of vital importance to everyone in every walk of life. No matter where your interests lie – in the products and processes of business or in the things which make for better and more efficient living – you will read this new magazine with profit, and with interest.

If you would like to keep abreast of the world of tomorrow make your reservation NOW for the first twelve issues of

Science
ILLUSTRATED
A McGraw-Hill Publication

Experience Plus "Know-How" Will Produce

Science
ILLUSTRATED
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DR. GERALD WENDT

Editorial Director: Editor, scientist, author, lecturer—most recently, full time science consultant for Time-Life . . . New York World's Fair Director of Science and Education . . . a practical, working scientist.

HARLEY W. MAGEE

Editor: Newspaper reporter, staff writer and, at one time, city editor for Associated Press in Chicago . . . formerly managing editor of Popular Mechanics . . . a writer with long experience in interpreting science for the lay reader.

DEXTER MASTERS

Editorial Consultant: Editor of Army Air Forces magazine, "Radar" . . . formerly staff member Radiatron Laboratory Massachusetts Institute of Technology . . . formerly member of Fortune's Editorial Staff . . . first editor of Tide.

To bring you this month by month reporting of progress and achievement McGraw-Hill has assembled the finest talent available. Working hand in hand with the men pictured here is a top-flight staff of science writers, artists and photographers . . . men with long experience in making science *understandable* and *interesting*.

In addition, the editors of SCIENCE ILLUSTRATED will have at their command the great technical, consulting, research, and world-wide news gathering facilities of the McGraw-Hill Publishing Company. 196 editors, writers and technical experts, which staff the McGraw-Hill publications, will serve as consultants. All of McGraw-Hill's publishing experiences and financial resources are behind this thrilling new magazine.

N.B. to Advertisers: *What kind of an audience will be available to you in SCIENCE ILLUSTRATED? Obviously, an alert, intelligent, forward thinking group of people . . . the sort of people that are a step ahead of the parade in interests, desires and purchasing power. The initial print order will be 500,000 copies. Forms close on February 10th for the April issue. Write to SCIENCE ILLUSTRATED or telephone your nearest McGraw-Hill office for complete information.*

FIRST ISSUE ON THE NEWS-STANDS APRIL, 1946

Price per copy 25 cents. Annual Subscription . . . $3.00 Per Year

Science Illustrated
330 West 42nd Street
New York 18, New York

Yes—I want to become a charter member of the best informed audience in the world. Enclosed is my check (or money order) for $3.00. Please send me the first 12 issues of SCIENCE ILLUSTRATED—starting in April, 1946.

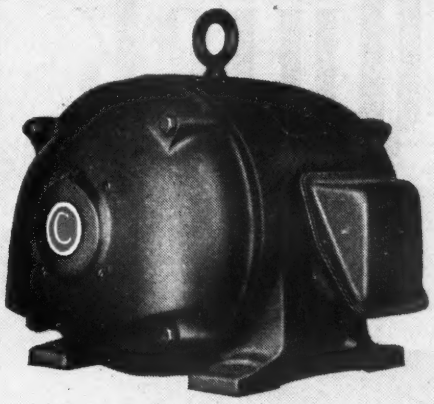
Name .....

Street and number .....

City and State .....

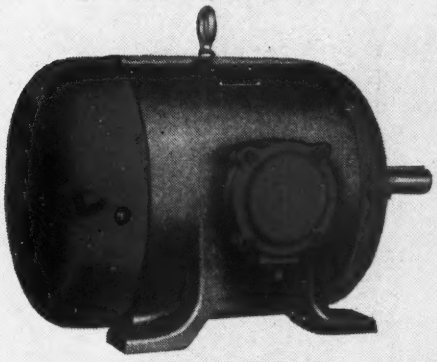
Use this Coupon

Form J — General Purpose Application



Splash Proof Protection

TEFC — Protects Against Destructive Dust, Grit, Powdered Materials



Explosion Proof

4 Types of Century Motor Protection

Each designed to prevent production stoppage from—falling solids, dripping liquids, and various atmospheric hazards

One of these four types of Century motors will provide protection against one or more of these conditions in your plant.

- Normal surroundings
- Dampness
- Falling solids
- Splashing liquids
- Acid and alkali fumes
- Destructive grit and dust
- Explosive dusts and gases
- Finely powdered or explosive materials in the atmosphere

Matching the motor characteristics to the job to be done is important—but it is only half the job if there are unusual and hazardous surrounding atmospheric conditions. Century offers a complete line of Open Protected General Purpose, Splash Proof, Totally Enclosed Fan Cooled, and Explosion Proof motors to meet the hazards of practically any atmospheric condition. When necessary, special insulations are also available to protect the motor windings in abnormal atmospheric surroundings.

If the motors in your plant are exposed to any of these dangers, it will pay you to guard against possible production losses by specifying the right Century protected motor to meet your conditions. If you want assistance with your motor application problem, a Century engineer will be glad to put his experience at your disposal. Call him in.

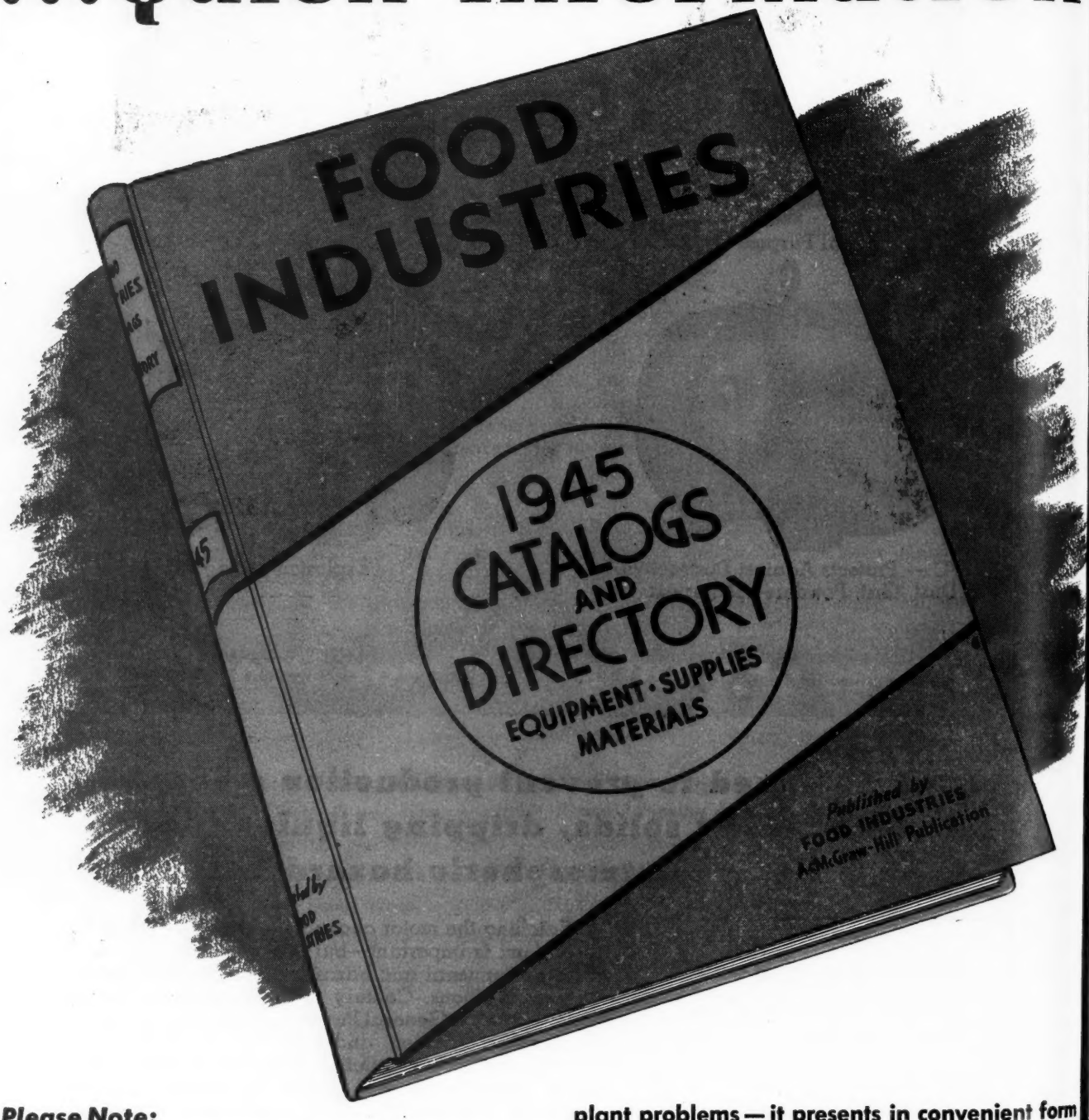
Century C MOTORS

CENTURY ELECTRIC CO., 1806 Pine Street, St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

423

...Quick Information


FOOD INDUSTRIES
1945 CATALOGS AND DIRECTORY
EQUIPMENT · SUPPLIES MATERIALS
Published by FOOD INDUSTRIES A McGraw-Hill Publication

Please Note:
Your copy of the 1945 Food Industries Catalogs & Directory has been mailed to you. Has it come to your attention? This year, more than ever before, you will find it useful in helping solve food plant problems — it presents in convenient form the information you want about equipment, materials and supplies and where to get them. Also, please see that it is available to your associates who could use it to advantage.

FOOD INDUSTRIES

in One Handy Volume

LOOK here first for the piece of equipment you need or for materials and supplies,

The Food Industries Catalogs & Directory, now in its seventh year, is available in every important food processing plant. The directory of products and their manufacturers is the only directory of its kind. When you have located the product you want, then turn to the catalog pages of leading manufacturers.

You will find products illustrated and with descriptive data and specifications. We know you will appreciate this quick information in one handy volume.

WHAT IT IS:

Here is the "looking-up place" for almost every product used in a food processing plant — equipment, materials, supplies. Food plant men have asked for this. They wanted one source of product information for their industry rather than having to hunt through many general catalogs which cover all industries.

WHAT IT DOES:

First of all, Food Industries Catalogs & Directory saves your time. Secondly, in its catalog pages it furnishes specific information on the performance of a product in a plant like yours. The catalogs are specially designed for food plant use. The manufacturers list only products that would be of interest to you — they clearly present the data you need to make an intelligent selection.

WHO MAKES IT and WHERE ARE THEY LOCATED?

Look in the Directory Section for the product you want . . . here products are listed alphabetically followed by the names and addresses of *all* manufacturers making them. Bold face listings direct you to the pages giving detailed catalog information. If you know the name of the company making the product and want detailed information about it, look in the *Alphabetical Company Name & Trade Name Index.* Manufacturers represented in the Catalog Section are listed in *bold face* type and the page numbers of their catalogs are given.

PLUS . . .

This year's book again carries the section of tested formulas for a wide variety of food products. These are reprinted from the popular feature in Food Industries magazine.

What They Say About FOOD INDUSTRIES CATALOGS AND DIRECTORY

"We would appreciate receiving a second copy of the Directory to be filed in the library of the Research Laboratory inasmuch as Dr. Sherwood's copy will not always be available to the research staff . . ."
General Mills, Inc.

●

"We have not as yet received our copy of the directory and catalog and would appreciate having one at our plant as we find it a useful guide in many ways . . ."
H. J. Heintz Co.

●

"I understand your new copy of the Food Industries Catalogs is out. I would appreciate having a copy."
Director of Research, Anheuser Busch, Inc.

●

"Confirming our telephone conversation while I was in New York. We feel that your Food Industries Catalogs & Directory would be a great advantage to us in helping determine new types of equipment that we can use in our bakeries. Will you please send me a copy to Philadelphia?"
The Great Atlantic & Pacific Tea Co.

●

"When the writer was in our Baltimore factory, we used to have copies of Food Industries Catalogs & Directory sent to us every year. Probably it is something we have to ask for, in which case will you kindly send us a copy?"
Cross & Blackwell Canadian Co., Inc.

●

CATALOGS AND DIRECTORY

Every Angle Covered

same with Betner Service

To put it another way, Betner service is complete, "from idea to finished bag." Not just bag-making, though we make them by the billion every year. But ideas, designs, art suggestions, packaging advice — Betner's complete service includes them all.

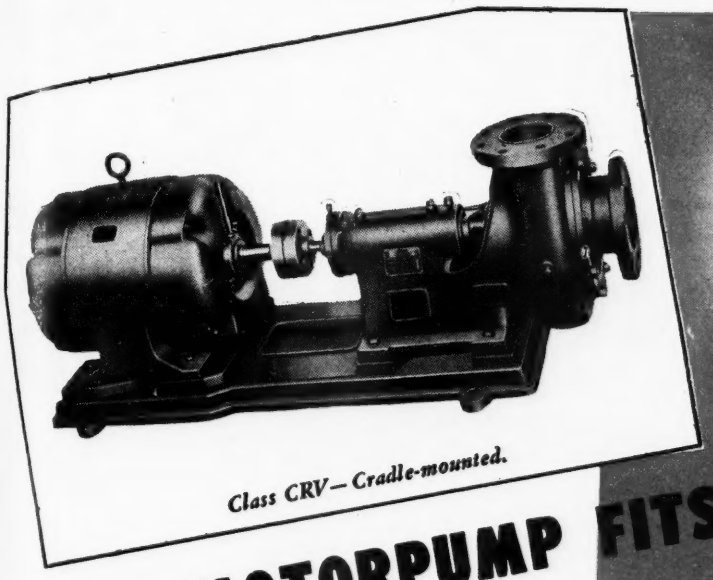
As the picture above so subtly hints, every packaging angle covered. And it's a service you can employ *all or part.*

Famous brands galore go to market under the protection of Betner Bags. Frozen foods, powdered and dehydrated foods, coffee, cereals, flour mixes, many others — they're all "Betner-bagged" for easy filling and sealing, for insurance against leakage, seepage, loss of bulk or flavor.

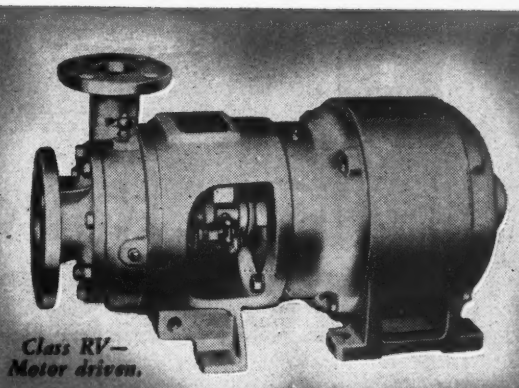
We've helped a lot of processors with their packaging perplexities; perhaps we can do as much for you. Remember, Betner service is at your service, all or part. Ask us more about it; you won't be obligated in any way.

Benj C Betner Co **DEVON, PA.**

Benj C Betner Co of California, Los Angeles, Cal.

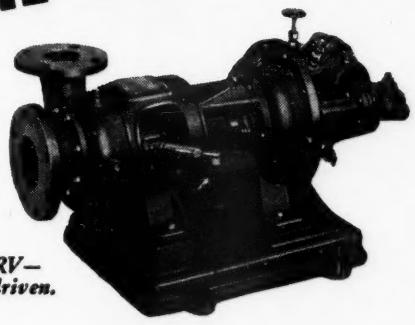


Class CRV—Cradle-mounted.



Class RV—Motor driven.

THE MOTORPUMP FITS YOUR JOB . . . . Exactly

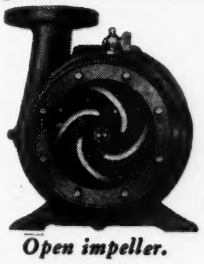


Class TRV—Turbine driven.

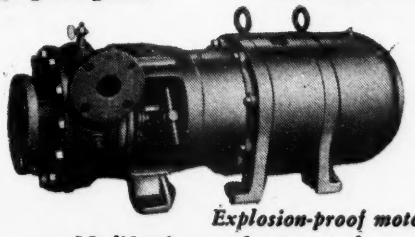
The Cameron MOTORPUMP

—an Ingersoll Rand Product

Smothering-type stuffing-box gland.



Open impeller.



Explosion-proof motor.

Modifications to fit your needs.

The Motorpump is not one pump—it is many pumps—one with built-in motor, one with built-in turbine, one on a cradle that enables you to change drivers, or one with special features for a particular service.

This is possible because Motorpumps are built as a completely integrated line . . . built to accommodate different drivers and special accessories without costly change of the basic units.

Furthermore, Motorpumps are *quality* units . . . made with the same wear-resisting features incorporated in larger Ingersoll-Rand pumps and—highly efficient, which keeps motor sizes small and power consumption low. They are available in a complete range of sizes for capacities up to 1800 gal per min—heads up to 600 ft.

Ask an Ingersoll-Rand engineer to give you complete details. He will be glad to leave a copy of our bulletin 7093. This gives complete details including dimensions, selection charts, and other essential details. Ingersoll-Rand Company, Cameron Pump Division, 11 Broadway, New York 4, N. Y.

AIR TOOLS
COMPRESSORS
ROCK DRILLS
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CONDENSERS
CENTRIFUGAL PUMPS
OIL & GAS ENGINES

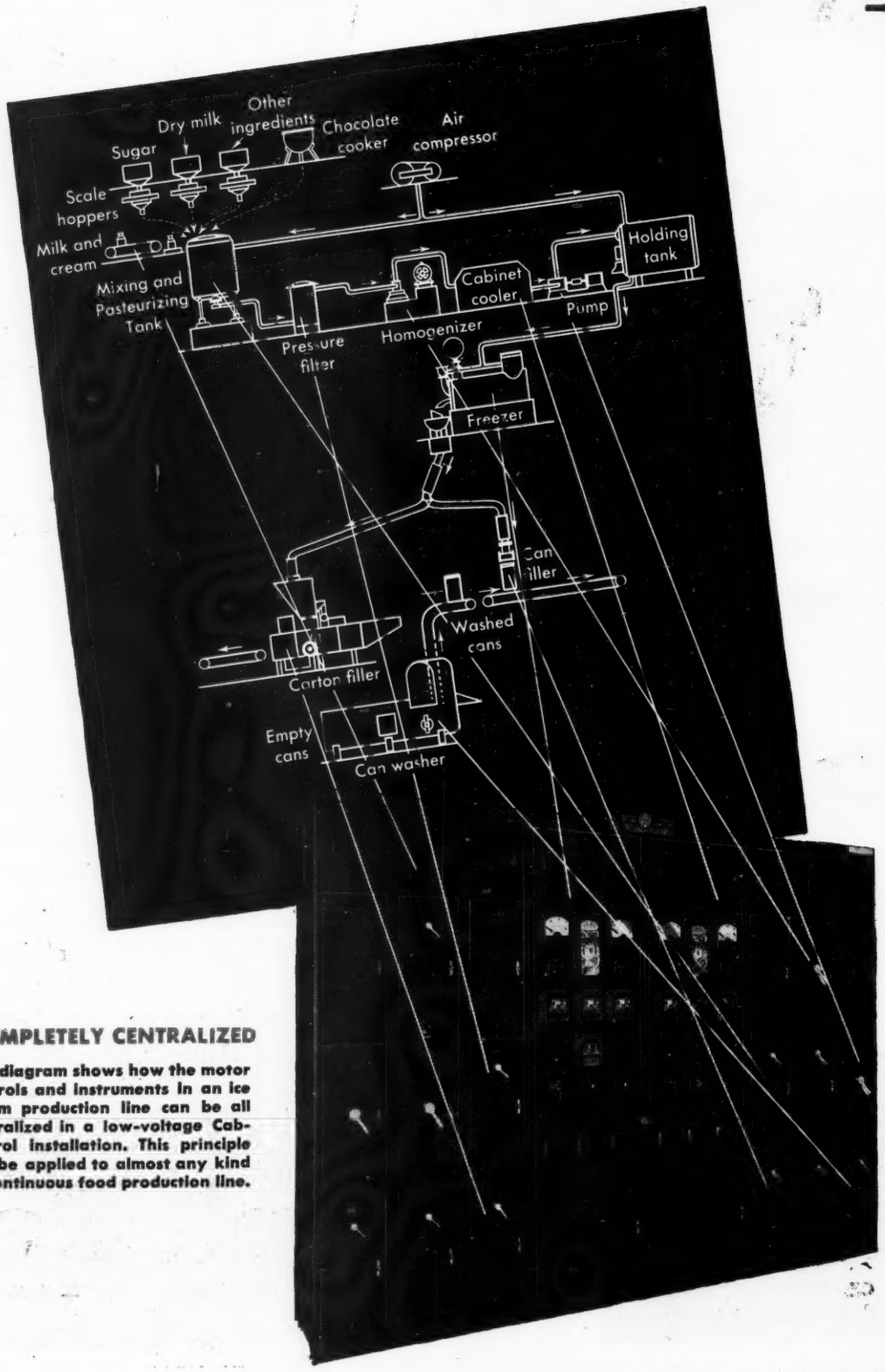
Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

CAMERON PUMP DIVISION

9-708

"PACKAGED" FOR CENTRALIZED PROCESS CONTROL—

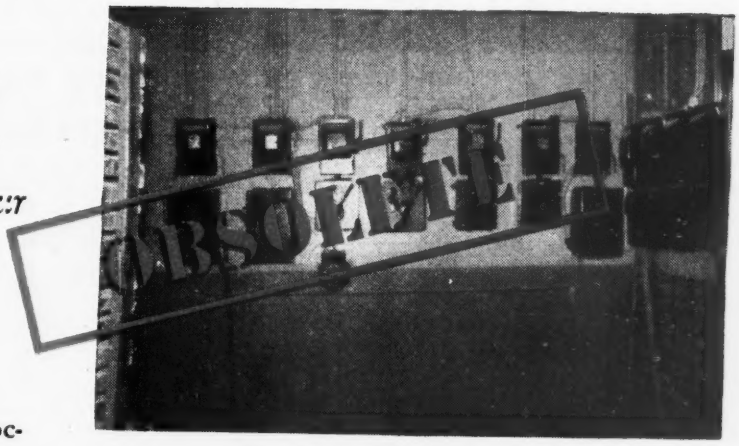


COMPLETELY CENTRALIZED

This diagram shows how the motor controls and instruments in an ice cream production line can be all centralized in a low-voltage Cabinetrol installation. This principle can be applied to almost any kind of continuous food production line.

Saves Time Reduces Spoilage ... yet costs no more!

A trim, easily installed G-E Cabinetrol system gives you highly centralized control over complex food processes, improves your plant's appearance, and increases personnel safety



You might think that the trim Cabinetrol process control system shown at the left would cost a lot more than a hodge-podge arrangement of individual controls like the one at the right. You'll be surprised to know that Cabinetrol actually costs less than a comparable assortment of individual controls, assembled and mounted in the plant. Not only is its first cost lower—it costs less to operate and maintain. Here's why—

CONTROL IS CENTRALIZED

Grouped in an orderly arrangement right in front of your operators are all the controls, gages, and recording instruments he needs. The result is tighter process control, a lower spoilage rate, and a better use of manpower.

CONTROL IS FLEXIBLE

As your process grows or changes, it is easy to add new Cabinetrol sections. You merely tell us the controls you need and we ship the complete unit. Installation is a matter of hours.

—ALSO CONTROL IS PROTECTED—AND PROTECTIVE

Note that Cabinetrol sections are dead-front. Your operators are fully protected from "hot" parts, control surfaces are protected against dust and dirt and indirect splashing, and your plant has had a low-cost face-lifting.

CALL G.E. IN EARLY

You'll save a lot of time and effort if you plan a centralized Cabinetrol installation at the same time you're blueprinting your next production line. By calling in a G-E application engineer before your plans are "set," you get practical electrical plans, slanted to give effectively coordinated process control with increased safety and attractiveness. For more data on Cabinetrol, write for Bulletin GEA-3856. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

653-17-110

Keep on buying BONDS—and *keep all you buy*

Electrical Aids FOR Food Plants

TO GET A BETTER KOSHER DILL
use easy-to-handle Basic Garlic Powder

GUARANTEED SATISFACTORY BACTERIOLOGICAL QUALITY FOR PICKLES
INSURES MORE "EXCELLENTS," FEW "FLABBY" AND "SLIPPERY" PICKLES

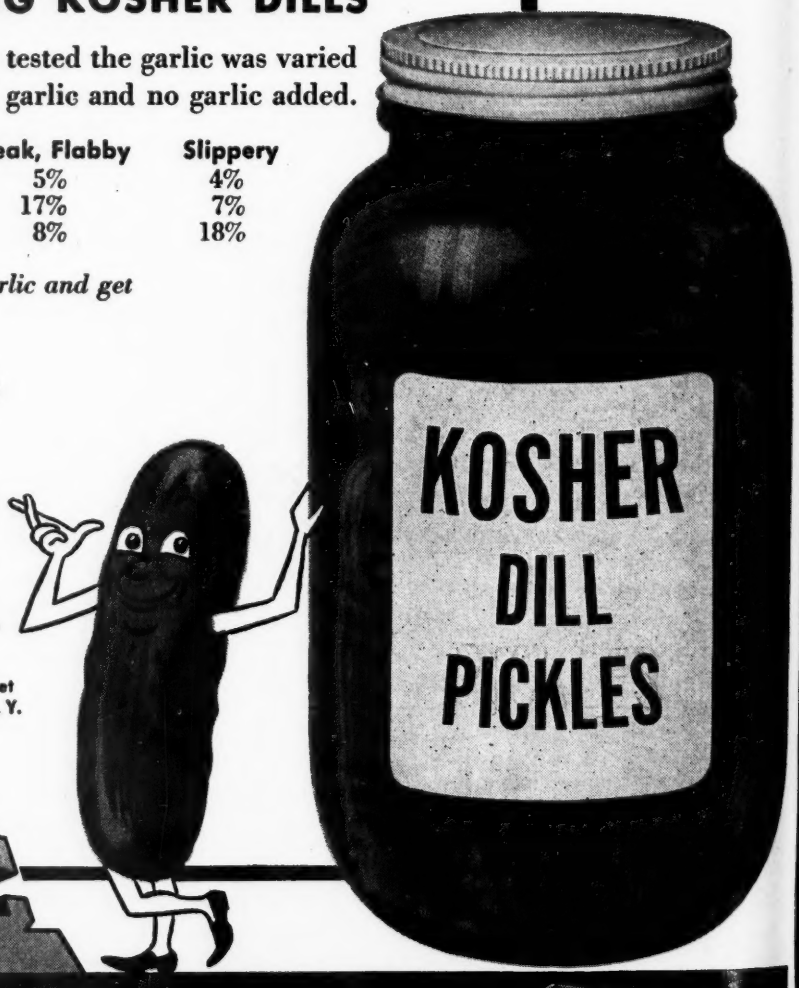
MICHIGAN STATE COLLEGE TESTS SHOW 17% MORE EXCELLENTS WHEN BASIC GARLIC IS USED IN MAKING KOSHER DILLS

In the numerous lots of pickles tested the garlic was varied using BASIC GARLIC, fresh garlic and no garlic added.

RESULTS:	Excellent	Weak, Flabby	Slippery
Basic Garlic	91%	5%	4%
No garlic added	76%	17%	7%
Fresh garlic	74%	8%	18%

CONCLUSION: *Use Basic Garlic and get*

1. BETTER PICKLES
2. MORE EXCELLENTS
3. CONSTANT GARLIC COSTS
4. LESS COST ON YOUR FINISHED PRODUCT
5. NO MESSY PEELING AND CHOPPING OF FRESH GARLIC



SEND FOR FREE BULLETIN No. 199

BASIC VEGETABLE PRODUCTS CO.
VACAVILLE, CALIFORNIA

315 Montgomery Street
San Francisco, California

100 Hudson Street
New York City, N. Y.

2376 E. 71st St.,
Chicago 49, Illinois

BASIC
REG. U.S. PAT. OFF.

MASTER GEARHEAD MOTORS

COST REDUCED by the elimination of bearings, couplings, chains, and sprockets, gear trains or separate gear reducers . . . only one unit to mount . . . lower assembly costs.

COMPACT. High reduction ratios secured in small space by using heat treated special alloy steels for both splined shafts and gears.

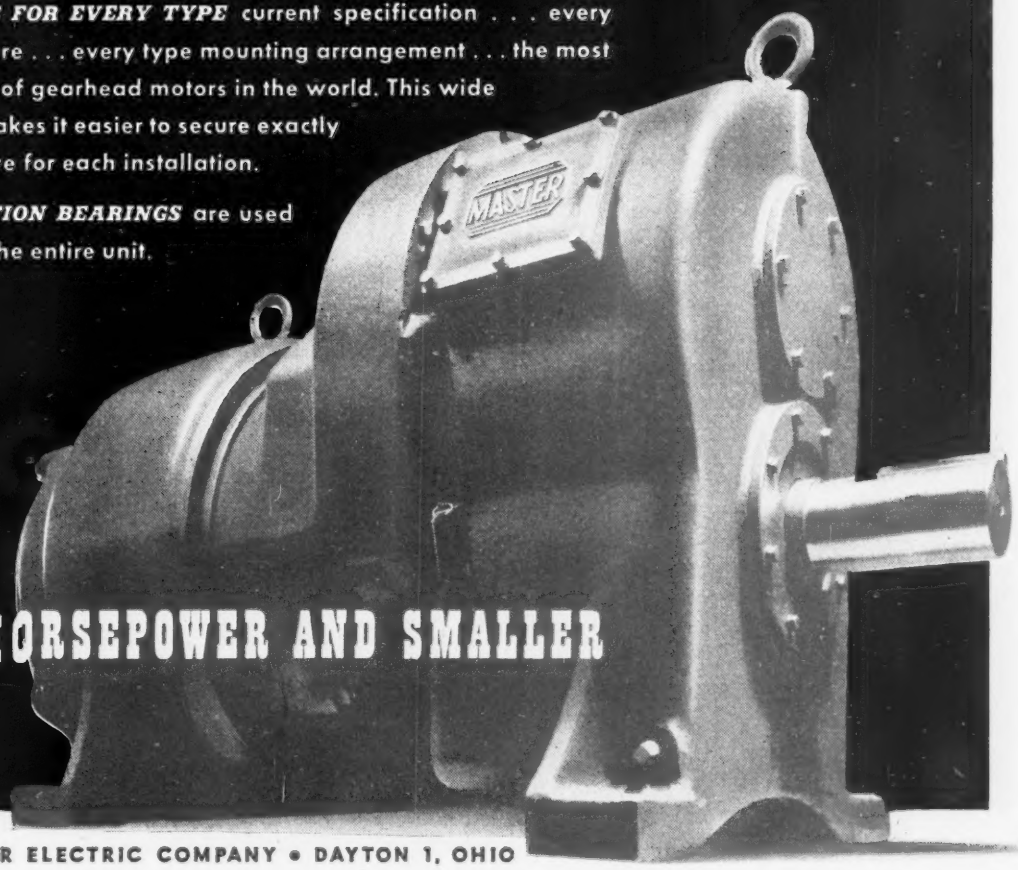
HIGHER EFFICIENCY than other types of slow speed drives . . . only 2 percent power loss in each stage of gear reduction, in parallel shaft types.

SIMPLIFIED DESIGN. More compact . . . less weight . . . permanent alignment . . . fewer moving parts . . . high efficiency . . . longer, reliable, trouble-free operation.

INTEGRAL CONSTRUCTION. Both motors and gears are designed, built, and guaranteed by one organization as a well balanced power package.

AVAILABLE FOR EVERY TYPE current specification . . . every type enclosure . . . every type mounting arrangement . . . the most flexible line of gearhead motors in the world. This wide flexibility makes it easier to secure exactly the right drive for each installation.

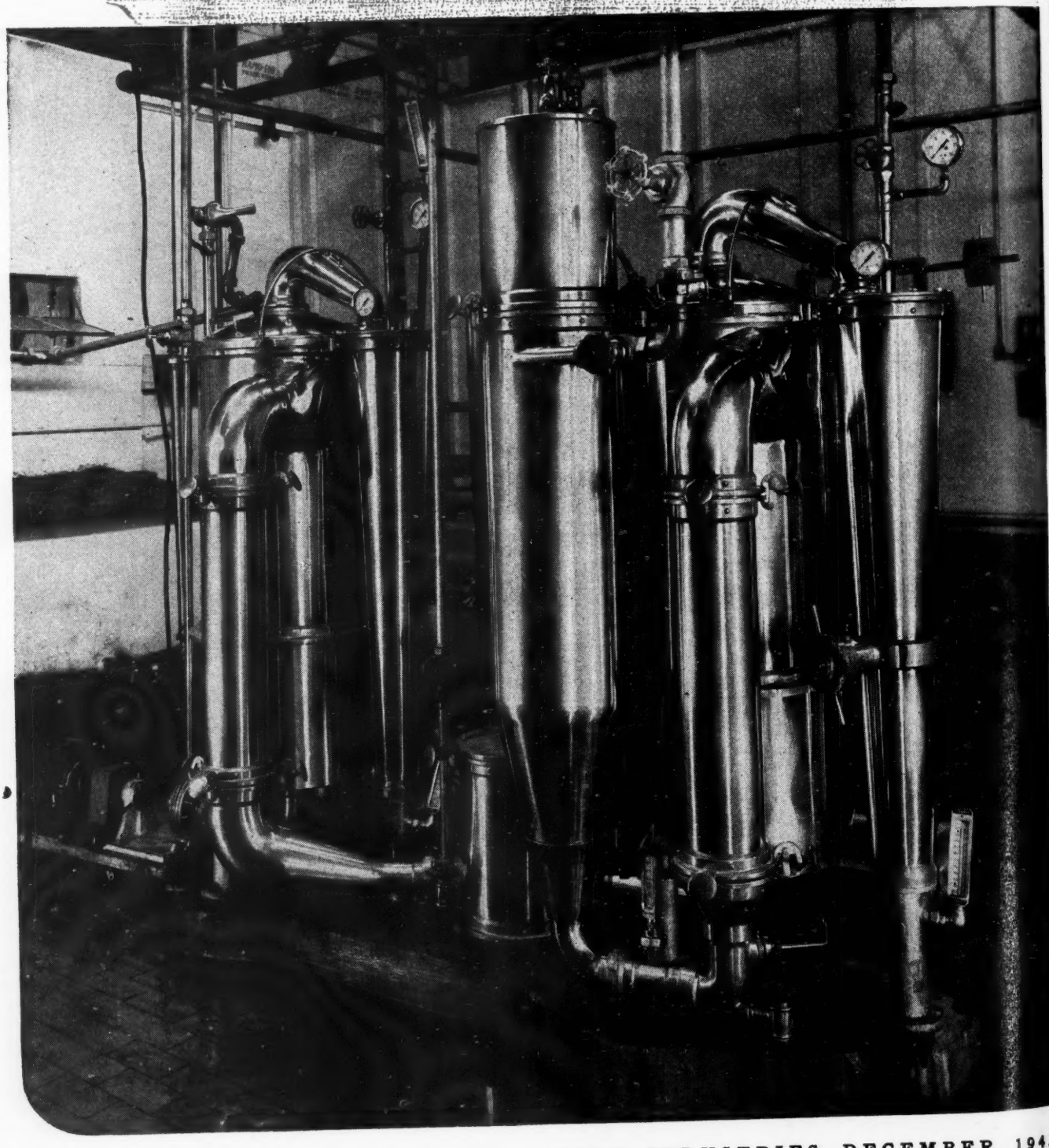
ANTI-FRICTION BEARINGS are used throughout the entire unit.



100 HORSEPOWER AND SMALLER

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

Enduro Pays in many ways



Improved Employee Relations
Easy to Clean
Sanitary Surfaces
Non-Contaminating
Strong—Long Lasting
Resistant to Rust and Corrosion
Easy to Fabricate
Universal Acceptance
Low Ultimate Cost

A smooth, sanitary surface—free from tiny pores in which contaminating bacteria can breed—is an inherent quality of long-lasting Republic ENDURO Stainless Steel.

Moreover, ENDURO does not contaminate metallically . . . has no effect upon foods or food products, and is not affected by them.

ENDURO is easy to keep clean, too. With warm soapy water, sticky or greasy substances come off quickly with a minimum of effort. And no matter how many times it is cleaned, ENDURO retains its hard, lustrous surface—because it is solid stainless steel all the way through.

For further information about these and other money-saving reasons why you should use Republic ENDURO Stainless Steel, write *today* to:

Typical of the many applications for sanitary Republic ENDURO Stainless Steel in food processing applications is the vacreator vacuum pasteurizer shown at the left and the meat separating table above. Others include: vats, cookers, conveyors, sinks, mixers, trays, tubing and various types of packaging equipment.

REPUBLIC STEEL CORPORATION
Alloy Steel Division · Massillon, Ohio
GENERAL OFFICES · CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic
ENDURO STAINLESS STEEL
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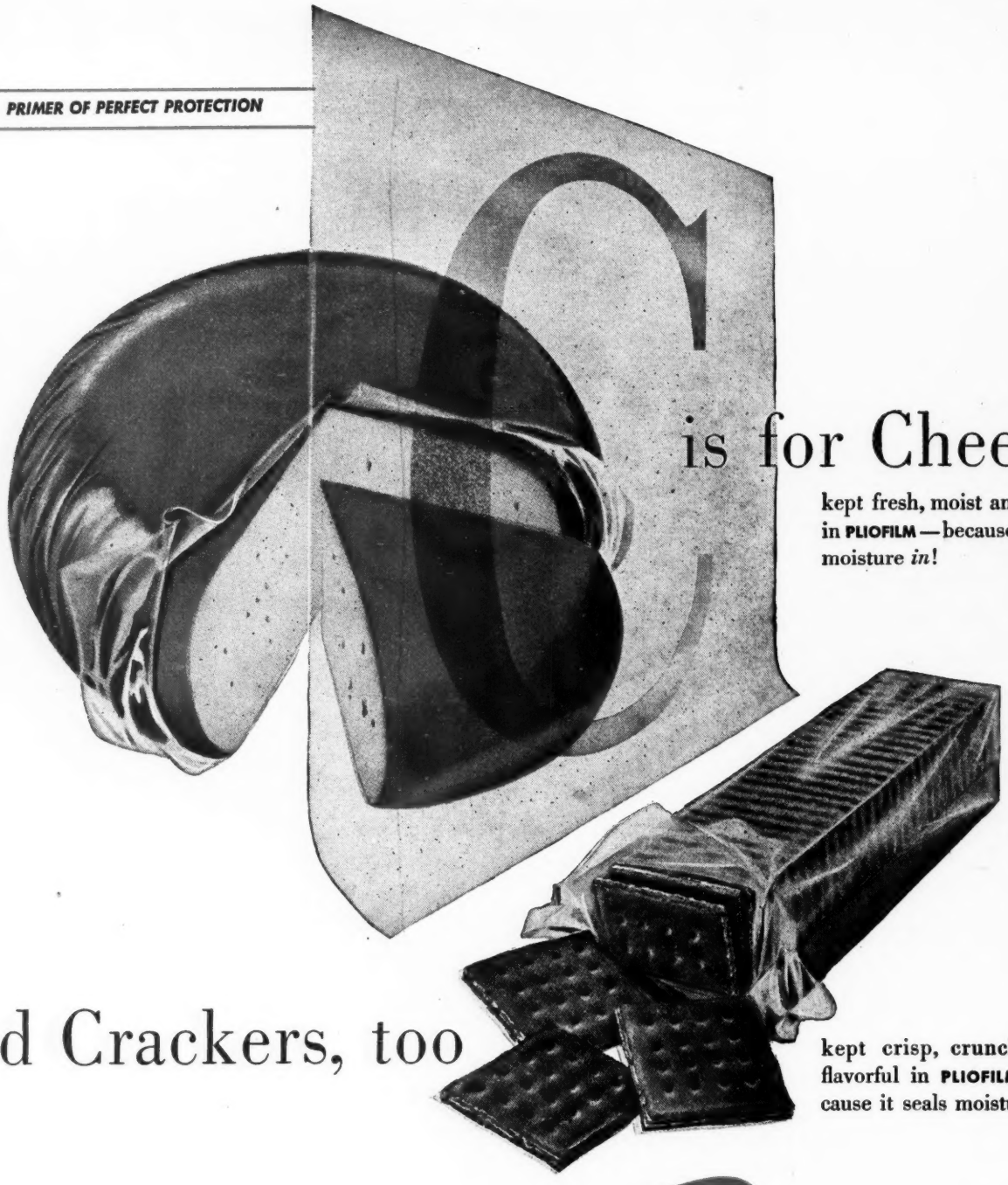
REPUBLIC STEEL SERVES THE WORLD

OTHER REPUBLIC PRODUCTS INCLUDE EX-L-ITE TIN PLATE—PIPE—SHEETS—UPSON BOLTS AND NUTS

PRIMER OF PERFECT PROTECTION



C is for Cheese

kept fresh, moist and tangy in **PLIOFILM** — because it seals moisture *in*!

and Crackers, too

kept crisp, crunchy and flavorful in **PLIOFILM** — because it seals moisture *out*!

You'll sell fine foods at a new peak of freshness and flavor just as soon as they can be packaged in **PLIOFILM** — for a double-barreled reason. ★ This transparent, air-vapor-proof wrapping has no equal for keeping moisture where it belongs — *inside* or *out!* ★ Best proof of that is the way **PLIOFILM** measured up to the job of moisture-protecting American warplane engines. ★ That is why none has been available for bringing harvest-ripe fruits and vegetables to American tables; for safeguarding tobaccos, drugs and all moisture-sensitive products. ★ But it's coming back, and alert merchandisers everywhere are planning now to **PLIOFILM** seal their wares — to assure the finest quality ever known. Goodyear, Chemical Products Division, Pliofilm Department, Akron 16, Ohio.

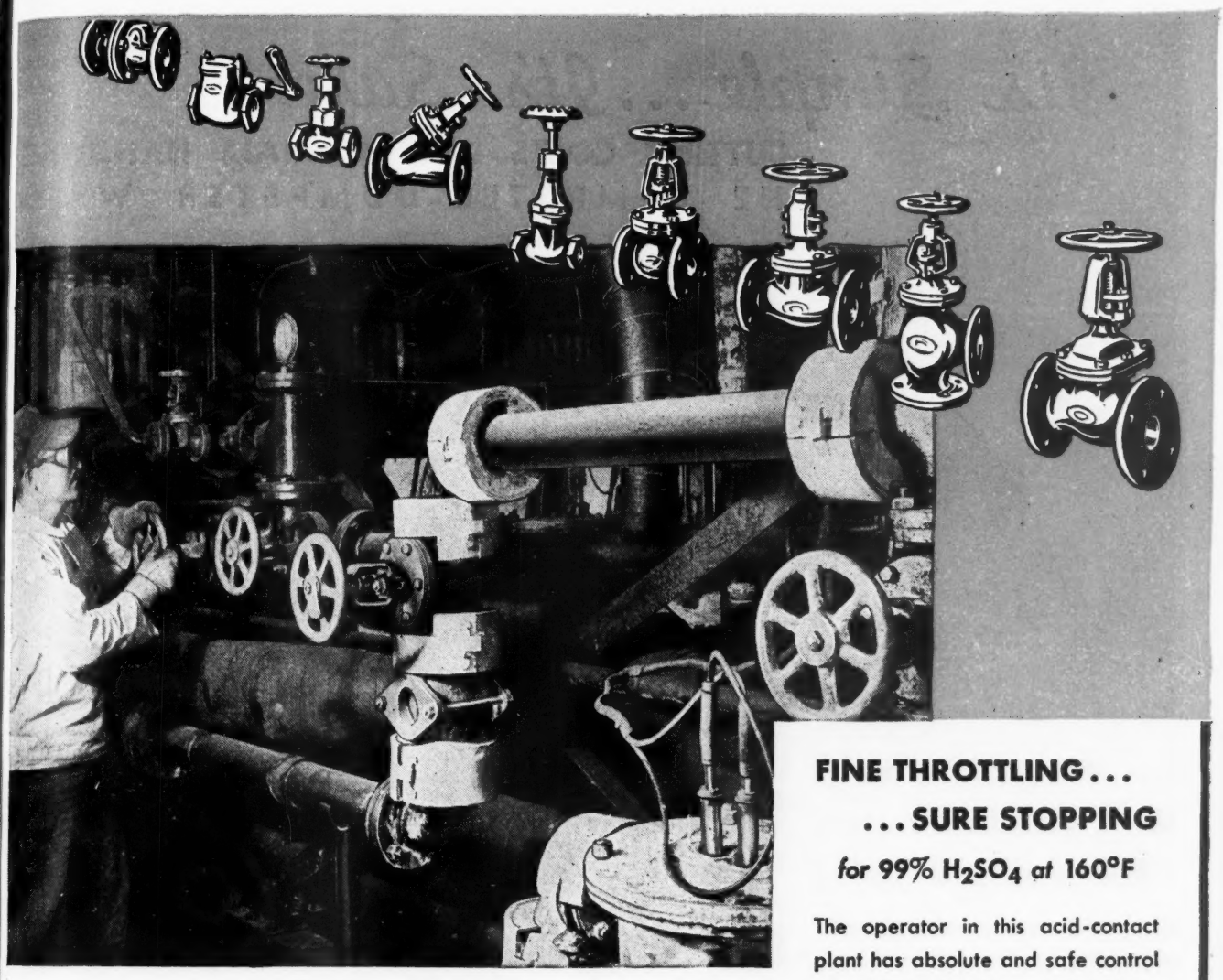
Pliofilm

A PRODUCT OF GOODYEAR RESEARCH

GOODYEAR

THE GREATEST NAME IN RUBBER

Pliofilm—T. M. The Goodyear Tire & Rubber Company



FINE THROTTLING...
...SURE STOPPING
for 99% H_2SO_4 at 160°F

The operator in this acid-contact plant has absolute and safe control with Aloyco-20 Valves, designed for fine throttling and fool-proof closure.

ALOYCO-20 VALVES
SOLVED THIS *ACID* CIRCULATING PROBLEM

The wide variety of Aloyco-20 Stainless Steel Valves enabled this Sulfuric Acid Manufacturer to achieve piping freedom. He also reduced repairs through proper valve application. Since Aloyco-20 resists Sulfuric over a broad temperature and concentration range, he was able to standardize on one alloy, thereby lowering inventories. Aloyco-20 can also help you.

SEND FOR DATA ON SULFURIC ACID HANDLING

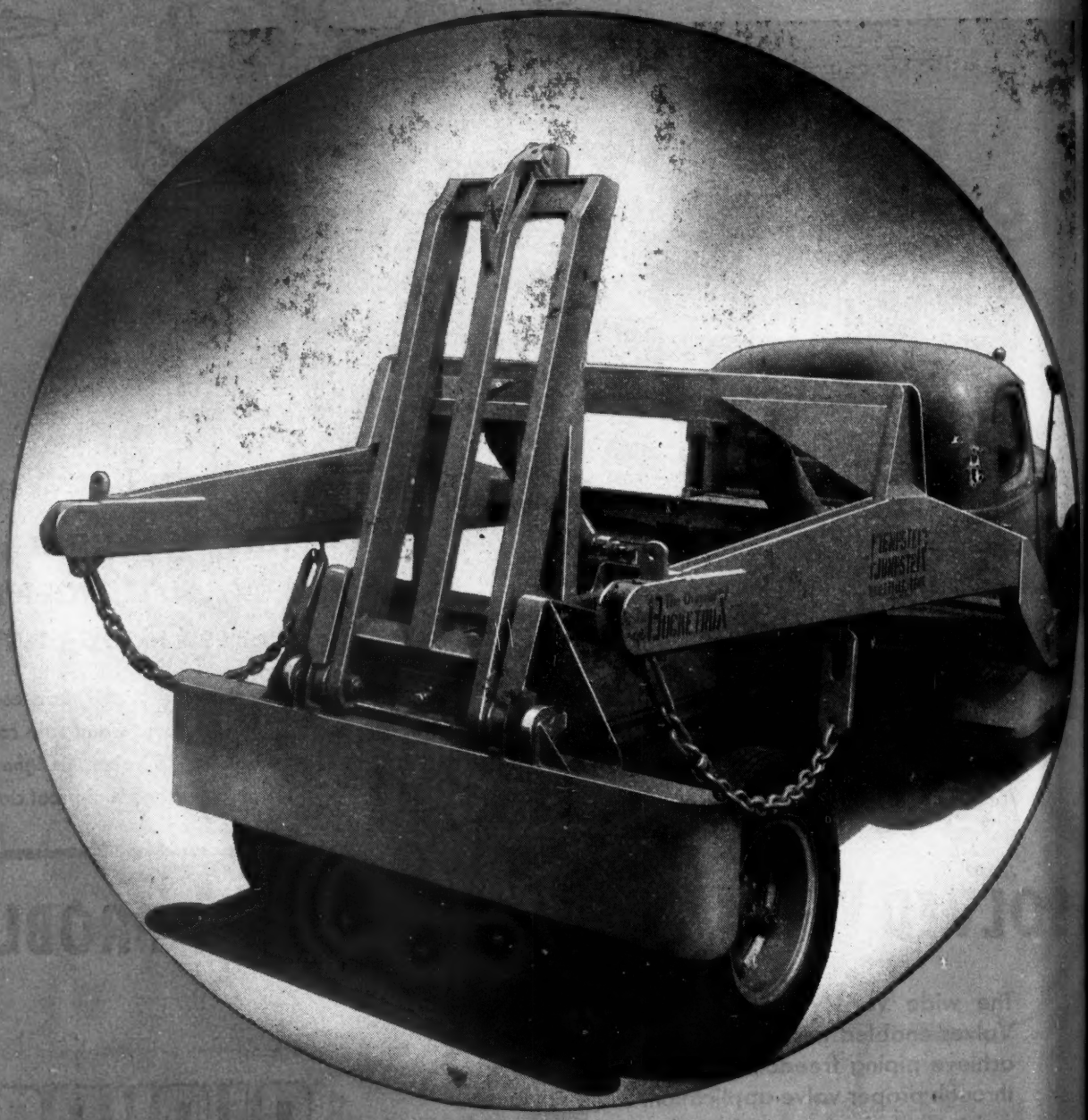
Sheet AS 20-1 gives metallurgical, mechanical and chemical data covering Aloyco-20. Shows valves in cross-section, dimensions, etc. Write for it.

ALLOY STEEL PRODUCTS COMPANY, INC.
1305 West Elizabeth Avenue • Linden, New Jersey

ALOYCO
Stainless Steel
VALVES and FITTINGS
GATE VALVES • GLOBE VALVES
Y VALVES • CHECK VALVES
LEVER THROTTLE GATE VALVES
TANK VALVES • SCREWED FITTINGS
FLANGED FITTINGS
GAUGE GLASS FITTINGS

It's Simple... It's Sure...

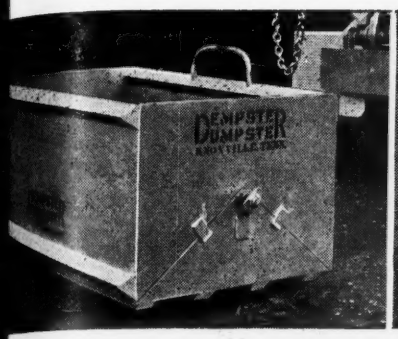
—CUTTING COSTS OF MATERIALS HANDLING THE DEMPSTER-DUMPSTER WAY!



★ Cutting costs of materials handling with the Dempster-Dumpster system is recognized very quickly by those already using conventional trucks. But, in hundreds of plants where materials handling systems are in use where trucks are not now required, the possibilities of the Dempster-Dumpster and its tremendous savings are often overlooked.

The Dempster-Dumpster is not an ordinary materials-handling-by-truck operation. The Dempster-Dumpster is a unit—made in several types and sizes—mountable on any truck chassis, for hoisting, placing in carrying position, and dumping any one of dozens of different types of Dempster-Dumpster bodies for handling every conceivable character of material. When installed on your truck chassis, this one unit will serve any number of bodies your operation may require. Some plants are using a single Dempster-Dumpster unit to serve 50 to 75 bodies. In certain cases several types of bodies, for various types of materials are used, and all served by a single Dempster-Dumpster.

DEMPSTER DUMPSTER
TRADE MARK REG.



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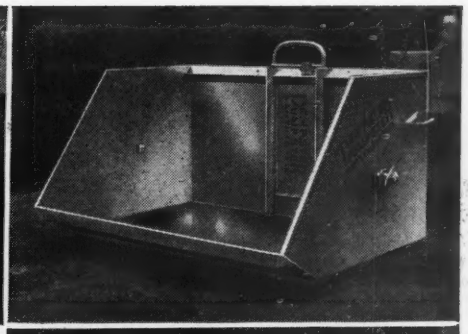
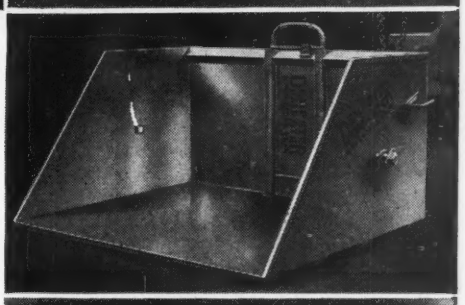


DEMPSTER DUMPSTER REGULAR BODIES

★ Shown above and at right, photos 1 through 5 inclusive, are five of our "regular" Dempster-Dumpster bodies. These are basic designs from which hundreds of variations, so-called "special" designs, are produced to meet the particular requirements of any materials handling problem. These "regular" bodies, in order, are: 1—Bottom dumping, 2—Tilt-type, 3—Skip-type with lip, 4—Skip-type flat bottom and, 5—Apartment-type for bulky materials, trash, or rubbish. These bodies are built in from 1½ to 10 cu. yd. sizes or 1½ to 7½ tons pay load capacities.



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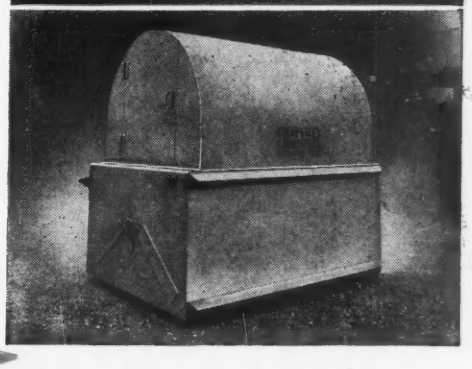
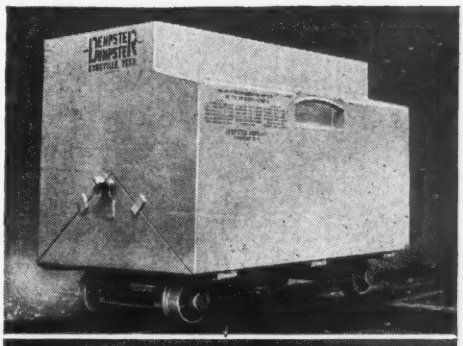


5

DEMPSTER DUMPSTER "SPECIAL" BODIES

★ Shown in photos 6 through 10 inclusive are five examples of "special" bodies, now serving some of the nation's largest industrial plants. Note in No. 6 that precision bearing, flanged car wheels have been adapted to a bottom dumping body. Wheels remain on body when picked up by Dempster-Dumpster for further transportation and dumping. Photo No. 7 shows a Tilt-type body developed for handling a semi-liquid material. No. 8 for handling dust collection. No. 9 for moulding sand. No. 10 for a finely ground material and having swivel casters for easy maneuverability in plant. Hot materials up to 1700° F are being handled by the Dempster-Dumpster, finished and unfinished products, light, heavy and liquid materials as well.

If you have any idea the Dempster-Dumpster may be adapted to your use to advantage, our engineers will gladly go over the matter with you. Write for our new Catalog No. 245 now. Dempster Brothers, Inc., Knoxville 17, Tennessee, U. S. A.



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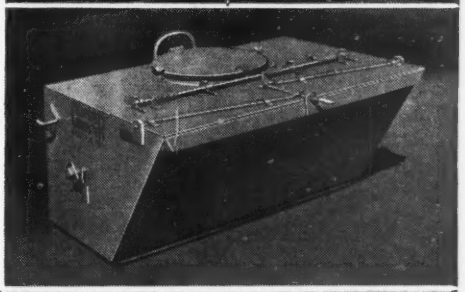

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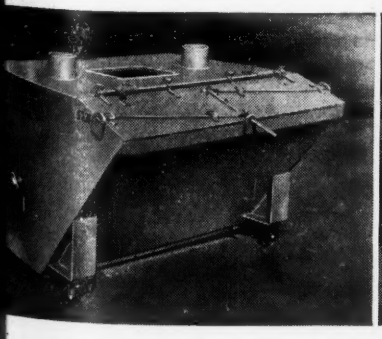

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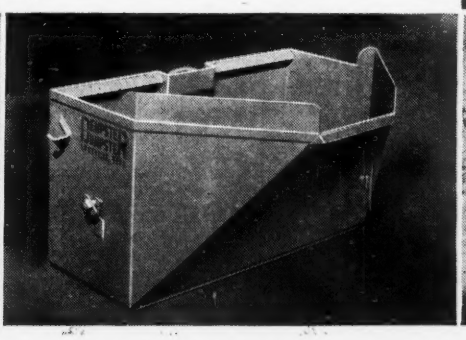
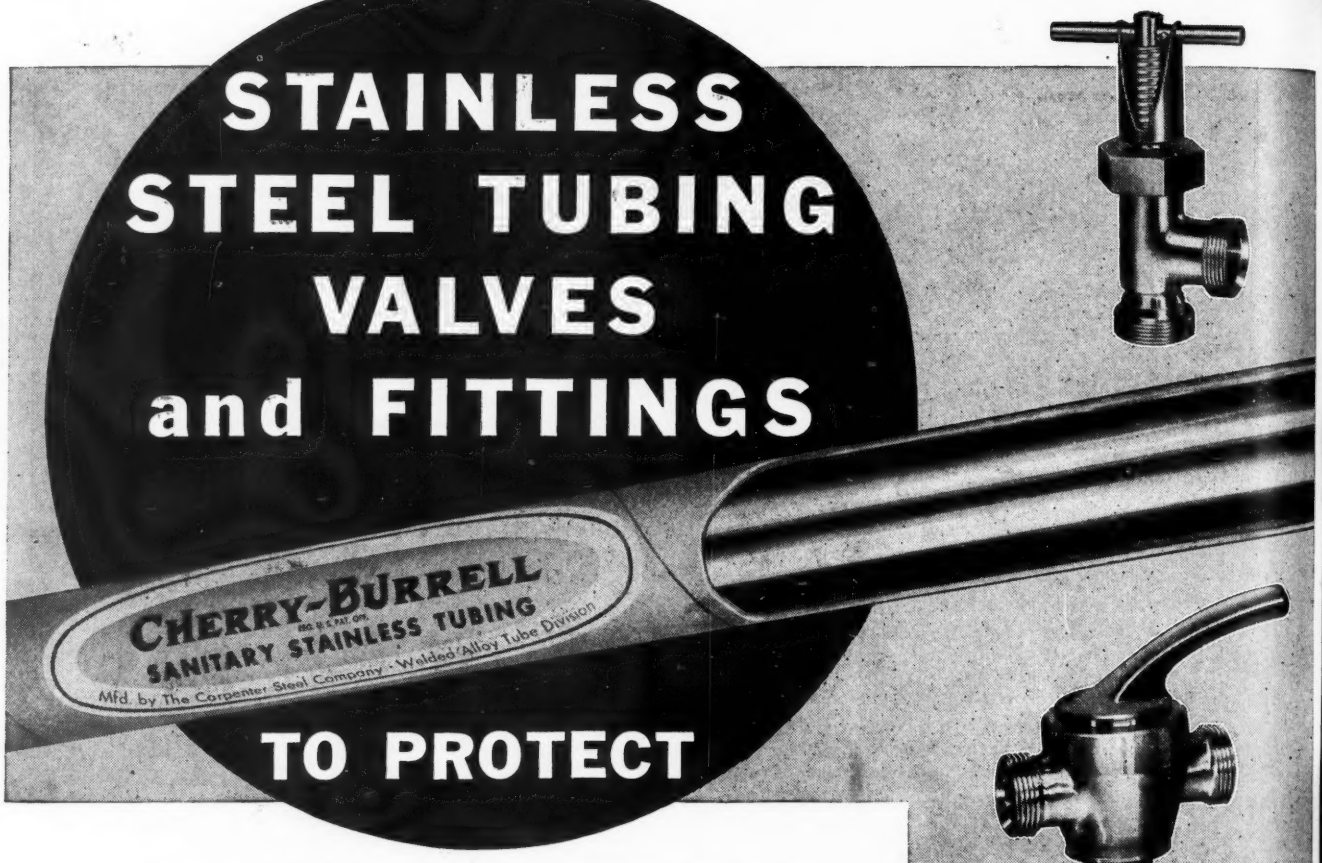


STAINLESS STEEL TUBING VALVES and FITTINGS



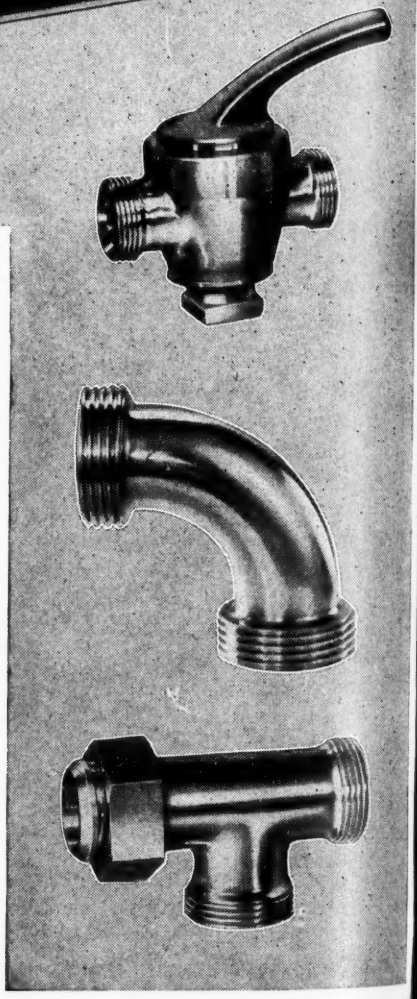
TO PROTECT

QUALITY and FLAVOR

High quality, 18-8 welded and polished Stainless Steel Sanitary Tubing. Standard sizes carried in stock by 15 Cherry-Burrell Branches and 9 Cherry-Burrell Associate Distributors from coast to coast. Prompt deliveries.

Stainless Steel Valves and Fittings. All standard sizes and types. Also available in nickel alloy.

Write for more complete information.



GEARED TO SERVE THE DAIRY INDUSTRY

FOOD FIGHTS FOR FREEDOM

CHERRY-BURRELL CORPORATION

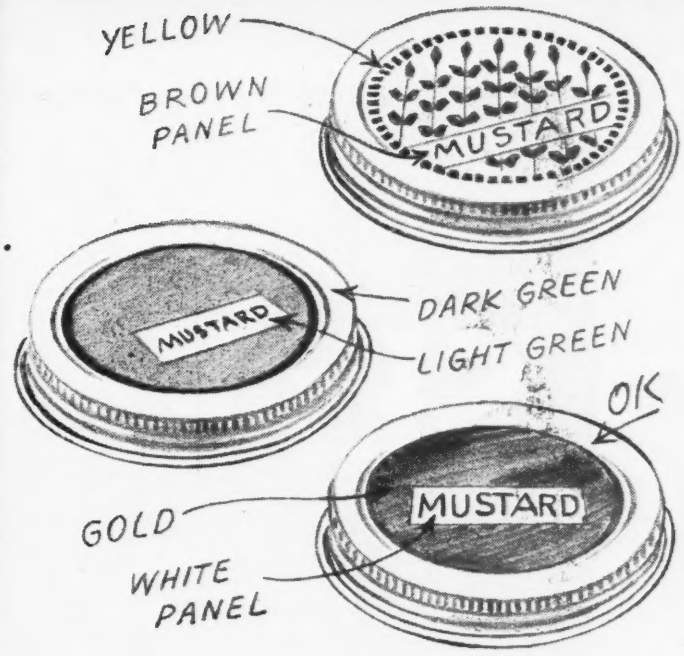
427 WEST RANDOLPH STREET, CHICAGO 6, ILLINOIS

Specialists in Equipment and Supplies for the Food Industry

FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 52 CITIES

USE A CAP DESIGN AS A "SHOPPER STOPPER"

1. YOU'LL CATCH many a shopper's roving eye and make more "impulse" sales when you fill that free advertising space on your caps with . . .



2. A BOLD, EYE-STOPPING DESIGN in sparkling color that makes your package work for you in the competitive display. And, with . . .

L and L

L & L ✓ OK

L and L

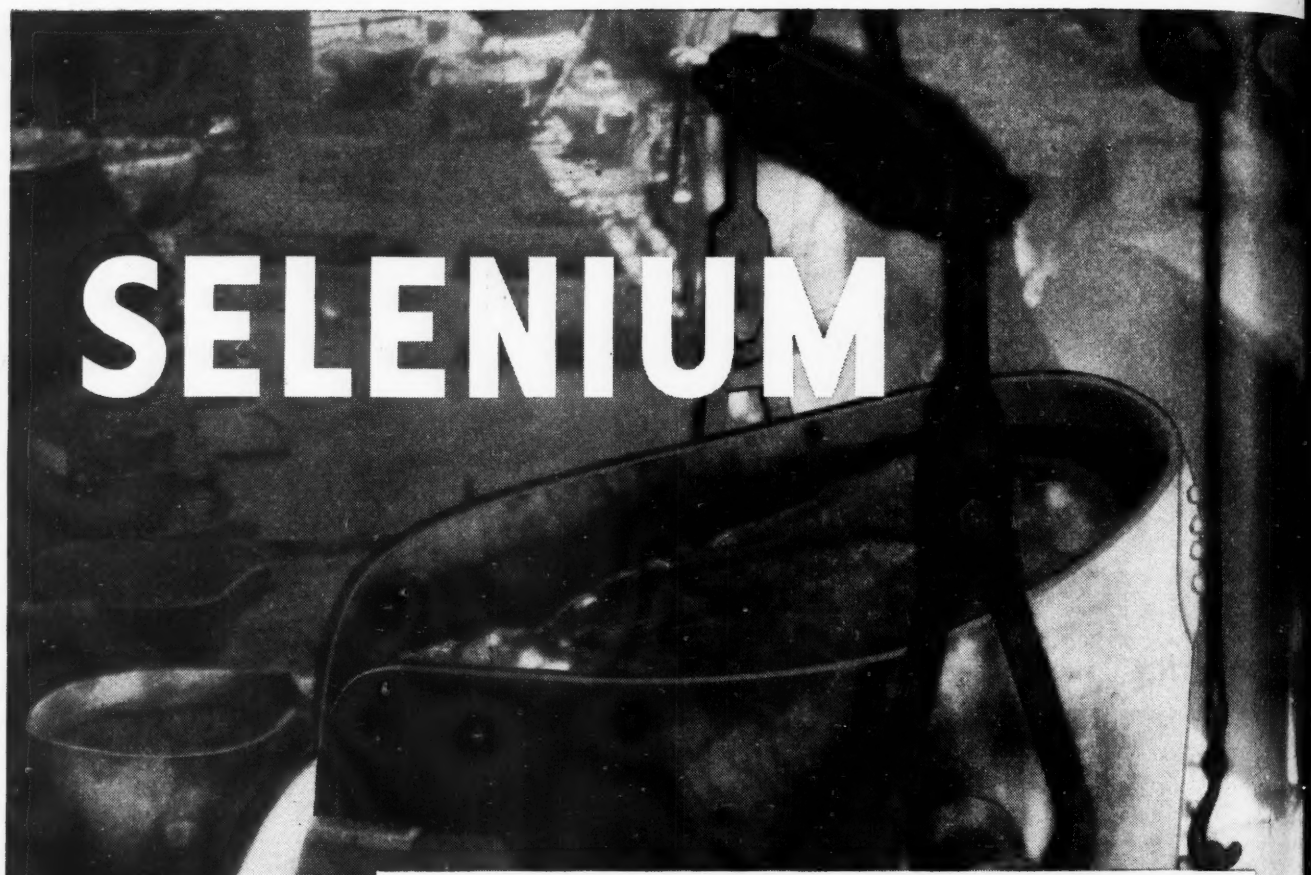
3. YOUR NAME OR TRADE-MARK legibly lettered in contrasting colors, your customers will be sure to see and be . . .

4. REMINDED OF YOUR BRAND every time your product is used in the home, thereby helping to build repeat sales.

Armstrong's Closures

TURN STANDARD CONTAINERS INTO STANDOUT PACKAGES

ARMSTRONG'S DESIGNERS will be glad to submit free cap design suggestions for your product. Just send a sample of your package to Armstrong Cork Co., Glass and Closure Div., 4212 Prince Street, Lancaster, Pennsylvania.



The "moon-metal" that keeps glass crystal clear

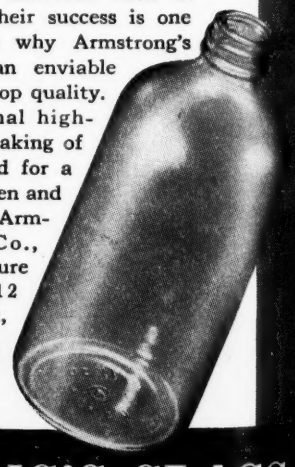
ALTHOUGH glass chemists still collect many headaches trying to produce absolutely colorless glass, they're having much better success since they learned how to use selenium.

This dull red "moon-metal," a by-product from the refining of copper and other metals, is a most efficient decolorizer for flint glass. It counteracts the coloring effect of iron, which is always present, even in the purest commercial ingredients, and which gives glass a blue-green, or yellow tint.

To use selenium successfully, however, requires considerable skill and experience. Selenium and the cobalt oxide and other materials usually added with it must be used in fantastically small proportions —about one-half ounce of selenium and about 1/16 ounce cobalt oxide per ton of batch! Furthermore, if the atmosphere of the furnace is not right, or if the finished ware is not carefully controlled during annealing, the selenium will not produce its beneficial action and off-colored glass will result.

Armstrong's glass chemists, through years of research and experimentation, have learned to handle successfully not only selenium but also the other difficult and temperamental materials used in glassmaking. Their success is one of the reasons why Armstrong's Glass enjoys an enviable reputation for top quality.

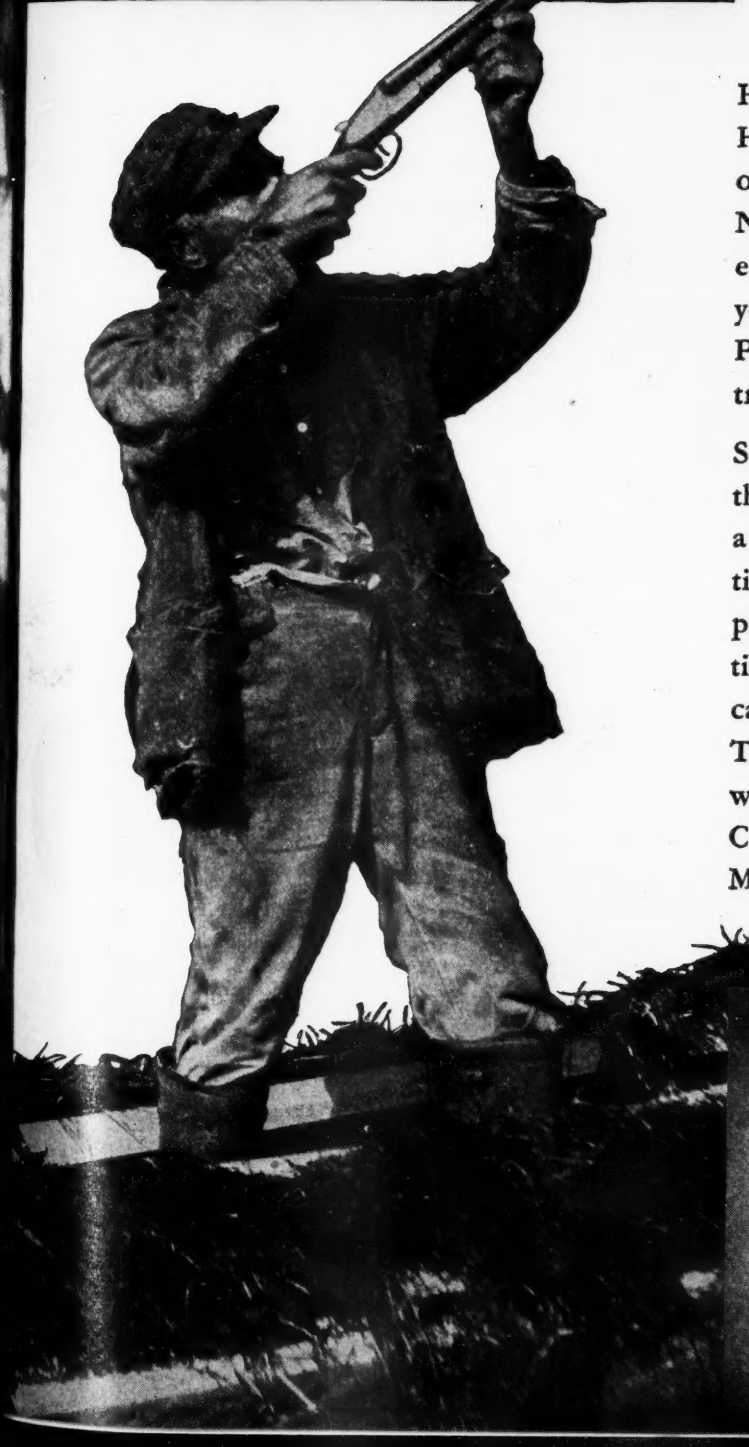
For additional highlights on the making of good glass, send for a free copy of "Men and Glass." Address Armstrong Cork Co., Glass and Closure Division, 4212 Prince Street, Lancaster, Pa.



ARMSTRONG'S GLASS

and

ARMSTRONG'S CLOSURES



Hunters and sportsmen everywhere find Horlick's Malted Milk Tablets a quick source of energy . . . a light meal in a few tablets. Natural or sweet chocolate flavored, they're easily digested . . . make a swell snack when you're "on the move" and don't want to stop. Put up in a handy pocket flask, they're ideal for travelers, businessmen and children as well.

Sold at drugstores and candy counters all over the country, Horlick's Malted Milk Tablets are a product of Horlick's Malted Milk Corporation, Racine, Wisconsin. Like so many quality products, they are securely sealed with attractively lithographed Crown Screw Caps—the caps with the exclusive, patented Deep Hook Thread that gives twice the sealing pressure with the same amount of application force. Crown Cork & Seal Company, Baltimore 3, Md. *World's largest makers of metal closures.*

CROWN
CLOSURES

CHECK THESE POINTS

against your Pump Requirements

- No gland to tighten.
- No packing to remove and replace.
- No contamination of product by packing material or lubricant.
- No packing to be affected by solvents or crystals.
- Shaft cannot be scored by packing.
- Open impeller—no close clearances.
- No rubbing or contact parts at any time.
- Made of corrosion-resistant materials.

All of the above features in a self-priming centrifugal pump.

Now apply these points, found in the LaBour Type G, to your requirements in terms of better production and reduced maintenance expense.

Send for copy of Bulletin 51.

THE LABOUR COMPANY, Inc.
Elkhart, Indiana, U.S.A.

LaBOUR
CENTRIFUGAL PUMPS

"Yessuh! Much up-to-date 'Merikan Fella grocery. Many long fine food in modern, clear view Foster-Forbes Fruit and Vegetable Jars."

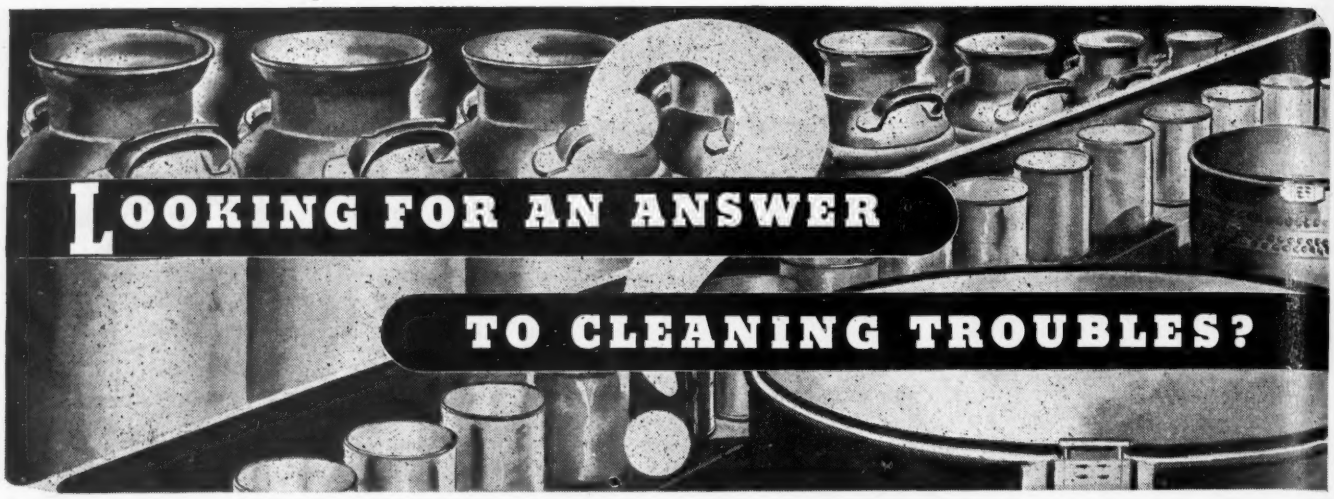
FOSTER-FORBES

Fruit and Vegetable Jars

FOSTER-FORBES GLASS CO., MARION, INDIANA, U. S. A.

SALES REPRESENTATIVES...

KANSAS CITY, DETROIT, CINCINNATI, CHICAGO, CLEVELAND, MILWAUKEE, ST. PAUL, ST. LOUIS, HAVANA, CUBA, ATLANTA, NEW YORK, MEMPHIS, LOUISVILLE



LOOKING FOR AN ANSWER TO CLEANING TROUBLES?

. . . Then consider these promising properties of QUADRAFOS—the hard-working polyphosphate:

•

QUADRAFOS disperses and deflocculates: Hard-to-clean spillage and cooked-on solids, that cause unsightly containers, are rinsed away thoroughly. Bottles and cans come shining clean . . . grease that causes labelling trouble is flushed down the drain.

QUADRAFOS conditions water: Streaking and hard-water film are eliminated, formation of milkstone deposit prevented—for QUADRAFOS effectively sequesters *both* calcium and magnesium . . . softens water without precipitation . . . assures fast, spot-free draining.

Investigate *all* the money-saving . . . money-*making* applications of QUADRAFOS (Sodium Tetraphosphate—$Na_6P_4O_{13}$). See how it can help solve process and production problems throughout your plant.

QUADRAFOS, the modern detergent, deflocculant, dispersant and sequestering agent, is available in three forms—

QUADRAFOS *Beads*—For preparation of stock solutions. In handy cotton dissolver bags.

QUADRAFOS *Granular*—A white, free-flowing powder, readily soluble, sized for convenient compounding with many detergent alkalies. 95% passes a 14-mesh screen.

QUADRAFOS *30*—White, free-flowing . . . very readily soluble. 95% passes a 30-mesh screen.

Rumford Chemical Works maintains a Technical Service Department to assist you in solving problems involving process water, wash water and other processes in which QUADRAFOS can be used to great advantage.

***For Information* and samples of QUADRAFOS, write Rumford Chemical Works, Technical Service Department, 16 Newman Ave., Rumford 16, Rhode Island.**

QUADRAFOS*

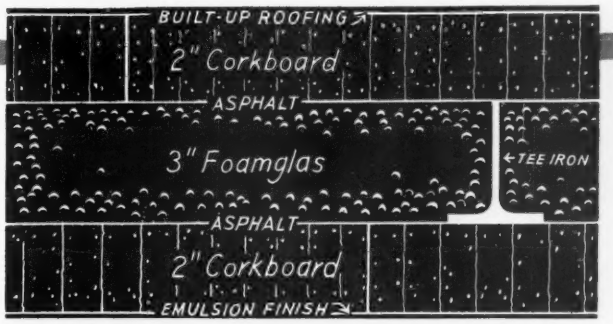
Manufacturers *REG. U. S. PAT. OFF.

RUMFORD CHEMICAL WORKS

16 NEWMAN AVE., RUMFORD 16, RHODE ISLAND

In This Cold Room, INSULATION IS BOTH CEILING AND ROOF

● **Built-up Roofing** covered with gravel applied over the 2″ top layer of corkboard on the roof of Goodnight Bros. cold room, Gastonia, N. C.



● **Unique construction** that uses insulation as roof and ceiling. The 3″ tees are on 18″ centers, supported by steel beams on 8′ centers.

SHORTAGE of lumber for roofing did not hold up erection of a cold room recently built by Goodnight Bros., Gastonia, N. C., because an ingenious tee iron construction, designed by Armstrong engineers, utilizes the structural strength of Corkboard and Foamglas*.

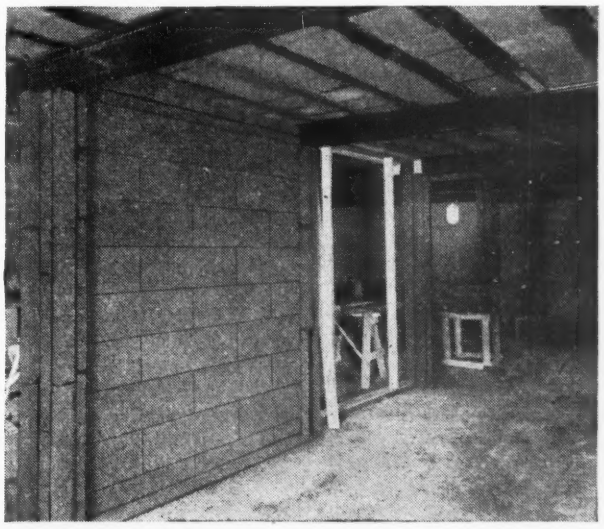
On this job, the two insulation materials—Armstrong's Corkboard and Foamglas—form both the ceiling and the roof. Their insulating efficiency protects the room against heat, and their strength and moisture resistance protect it against weather.

Steel beams on 8′ centers crossed with 3″ tees support this construction. A 3″ layer of Foamglas is laid between the tees. One 2″ layer of Armstrong's Corkboard is applied with asphalt to the underside of the Foamglas, and another 2″ of corkboard on top forms the roof deck. This unusual roof construction allows big savings in materials and also provides an excellent barrier against heat and moisture. Armstrong's Corkboard supplies high insulating efficiency and natural moisture resistance. And the inner layer of Foamglas —the rigid insulation composed of tiny sealed glass cells—is a positive, permanent moisture seal that's fireproof, too.

Walls and Floor, too

To complete the insulation construction, walls, floor, and partition of the rooms are insulated with two layers of 2″ corkboard.

When you plan new low-temperature refrigerated space, take advantage of Armstrong's 40 years of experience. Let Armstrong's Contract Service help you use insulation most effectively and economically. For complete information, write today to Armstrong Cork Company, Building Materials Division, 4212 Concord Street, Lancaster, Pennsylvania.



● **Shortage of lumber** inspired the use of insulation as a roof construction for Goodnight Bros., Gastonia, N. C. The ceiling above shows Foamglas in place, before the under layer of 2″ corkboard was applied. The partition wall is built of two layers of 2″ Armstrong's Corkboard, laid in hot asphalt.

** Reg. U. S. Pat. Off. Product Mfg. by Pittsburgh Corning Corp.*

ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service For All Temperatures

From 300° Below Zero

To 2600° Fahrenheit

FLAVOR AND FRAGRANCE

SLIPPING OUT OF

YOUR PRODUCT?

stuck?

GUARD THAT FRESHNESS

WITH LOW-COST

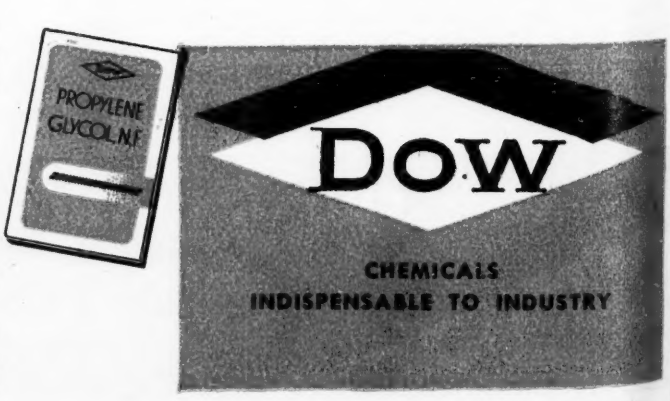
PROPYLENE GLYCOL!

Dow Propylene Glycol, n.f.

You want your product to put its best foot forward . . . to reach your customers in all its original freshness and flavor! Now's the time to investigate Dow Propylene Glycol, N.F. . . . the low-cost ingredient that helps hold flavor and moisture and checks mold growth at the same time.

Propylene Glycol is an excellent vehicle for many flavorings and perfumes. It distributes them evenly throughout your product . . . its relatively low evaporation rate helps to keep them there. Propylene Glycol acts, too, to retain the moisture that is so important a part of freshness, and it is an effective inhibitor of mold growth.

Dow Propylene Glycol meets National Formulary standards of purity . . . may be used in edible products. See what it can do toward keeping *your* product youthful! Dow's free booklet gives you the details. It's yours for the asking.



THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit
Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

It's THE "LEAD" IN THE PENCIL THAT COUNTS

and it's the 20% layer of STAINLESS STEEL in INGACLAD *that gives the Service you need!*

For many jobs it is just as impractical to use solid stainless as it would be to insist on an "all-lead" pencil. The "backing" element in both cases gives you a more practical . . . more economical product for most uses.

If you are planning on modernizing your plant equipment or products by using stainless steel, investigate IngAclad Stainless-Clad.

As producers of both Ingersoll Solid Stainless and IngAclad, our engineers will advise you without prejudice and without charge.

Users of IngAclad Include:

Angeles-Campfire Co.
Armour & Co.
Campbell Soup Co.
Carnation Milk Co.
Coca-Cola Bottling Co.
Corn Products Refining Co.
Fleischmann Co.
General Foods Corp.
Kraft-Phenix Cheese Co.
Libby, McNeill & Libby
Morton Salt Co.
Quaker Oats Co. (Canada)
Standard Brands Inc.
Swift & Co.
and many others.

INGERSOLL STEEL & DISC DIVISION
Borg-Warner Corporation
310 South Michigan Avenue
Chicago 4, Illinois

Plants: Chicago, Illinois; New Castle, Indiana; Kalamazoo, Michigan

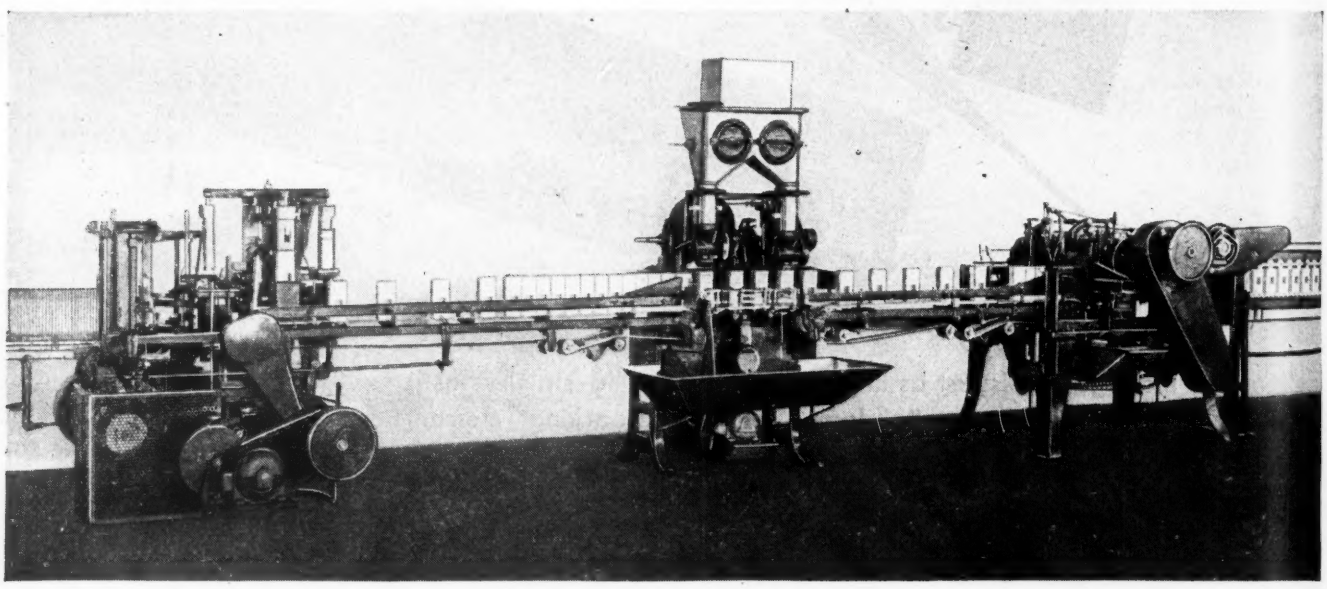
ENGINEERING B-W PRODUCTION

INGACLAD
STAINLESS-CLAD STEEL

"PNEUMATIC"

the name that means Lower Cost Per Container

PACKAGING EQUIPMENT



CARTON FEEDER—BOTTOM SEALER TWO SCALE WEIGHER TOP SEALER

HERE is a Pneumatic four-machine hook-up that's a winner every time when it comes to packaging common everyday household items in printed seal-end cartons.

Ruggedly constructed and noted for their operating efficiency these Pneumatic machines (Carton Feeder, Bottom Sealer, Two Scale Weigher and Top Sealer) are in daily use throughout the country handling numerous products such as: peas, beans, rice, sugar, naphtha flakes, spices, salt, water softener, soap powder, cornstarch, macaroni, flour, gloss starch, cracker crumbs, washing powder, barley, tea, coffee, baking powder, etc.

The packaging installation pictured above is rated at 25 to 35 packages per minute. Being readily adjustable, it is entirely practical to run a variety of products and a range of carton sizes on these fully automatic machines.

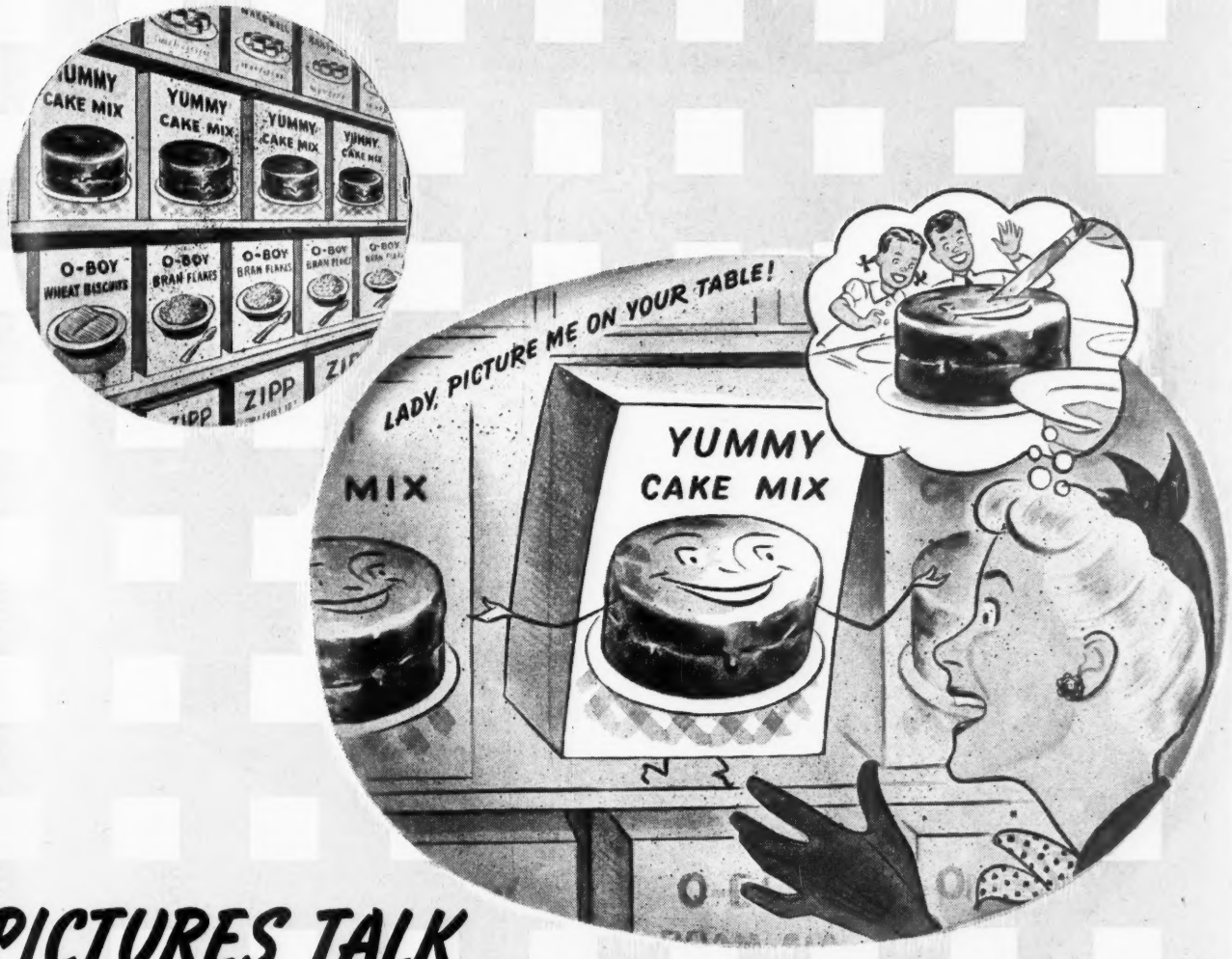
Important to you, as users will verify, is the fact that all these features add up to *Lower Cost Per Container*. You'll find it pays to consult Pneumatic whenever you have a packaging problem. Expert advice from our staff of experienced and qualified engineers is yours for the asking. Pneumatic Scale Corporation, Ltd., 91 Newport Ave., North Quincy 71, Mass. San Francisco, New York, Chicago, Los Angeles

1895 FIFTY YEARS OF PROGRESS 1945

★ ★ ★

PNEUMATIC
PACKAGING AND BOTTLING
MACHINERY

★ ★ ★



PICTURES TALK

...on Coated Lithwite Cartons!

THEY COME UP WITH SHARPER REALISM—GIVE PACKAGES A MORE PERSUASIVE POWER THAT SELLS MORE GOODS

WIDE-AWAKE EDITORS know it. Smart advertisers know it. Canny merchandisers know it, too. *Pictures get more attention, get ideas over faster than type or abstract designs.* And pictures on *Coated* Lithwite cartons really pack a wallop!

At the point of display—the most vital link in your sales chain—they speak right up and sell. For smooth, velvety *Coated* Lithwite cartons are made of a revolutionary paperboard that reproduces pictures with brilliant and persuasive realism. And these crisper cartons have a quality look and feel that subtly influences shoppers.

When can you get *Coated* Lithwite cartons?

Sorry we can't give you a definite answer. Right now the Gardner-Richardson carton plants can't begin to meet immediate demands. But here's a suggestion: discuss the matter of future Coated Lithwite carton deliveries with a Gardner-Richardson sales representative, now.

Note These Outstanding Coated Lithwite Advantages

1. **Made by a revolutionary process.** *Coated* Lithwite is the brighter, whiter paperboard that is formed, made and coated in one high-speed operation. Proved and improved for six years.

2. **Means more eye-appealing cartons.** *Coated* Lithwite has a smooth, rub-resistant, chalk-free surface. Forms a better base for printing inks and plates—reproduces even the smallest type cleanly, crisply. Brings colors up brilliantly—gives halftones a sharp realism.

3. **Fewer jammers and leakers.** *Coated* Lithwite scores without flaking or shattering. Takes a positive, tight seal.

The GARDNER-RICHARDSON Co.

Manufacturers of Folding Cartons and Boxboard

MIDDLETOWN, OHIO

Sales Representatives in Principal Cities: PHILADELPHIA · CLEVELAND · CHICAGO · ST. LOUIS · NEW YORK · BOSTON · PITTSBURGH · DETROIT

They got the idea from Crown Can

YES, it's true. From our very beginning we have gone in for personalized service in a big way. Being no chair-warmers, Crown officials spend much of their time in the field. They call on the trade regularly, helping Crown customers with their packaging problems, keeping them hep to the latest canning procedure. What with such service and the fact that we produce cans of highest quality, it is easy to see why we have come along so fast . . . If you'd like to get in on this good thing, just drop us a line.

CROWN CAN

INDEPENDENT AND HELPFUL

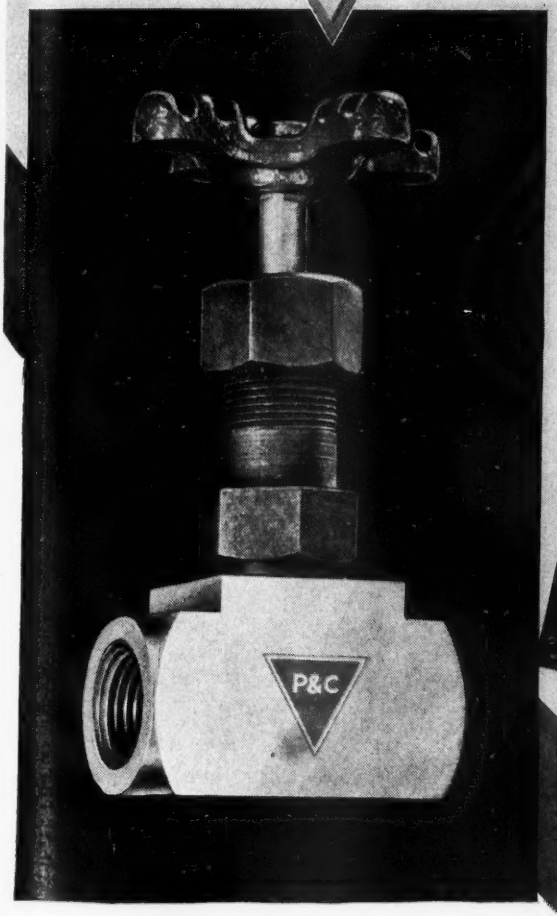
CROWN CAN COMPANY • NEW YORK • PHILADELPHIA • Division of Crown Cork and Seal Company, Baltimore, Maryland

A *Tough* LITTLE VALVE OF ALL WORK

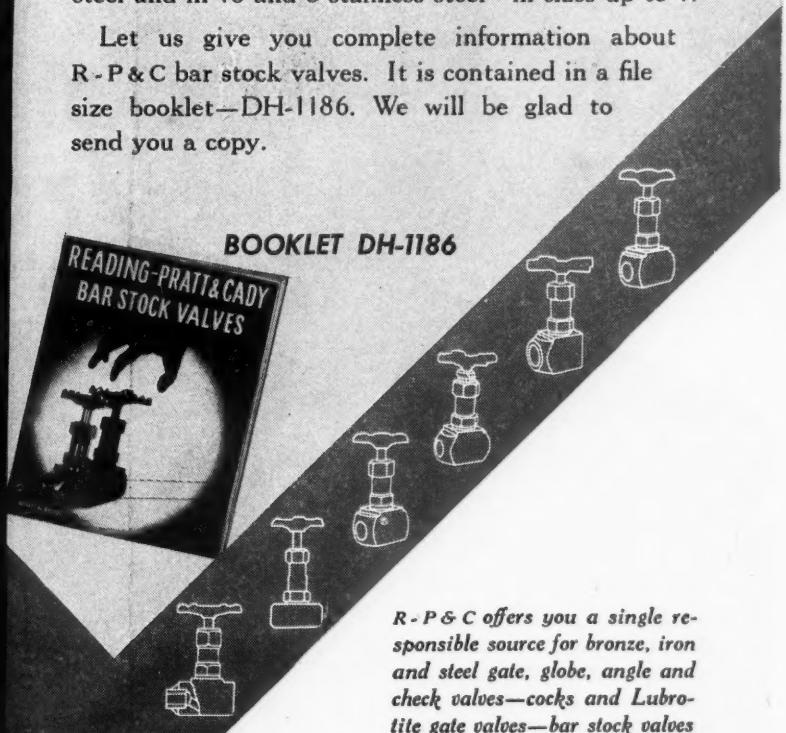
• This line of "bar stock" valves was developed by R-P&C as rugged, economical, close control valves. But experience in service quickly demonstrated their usefulness practically anywhere that a small, tough valve is needed for either close control, normal regulation or shut-off. Their service, pressure and temperature ratings extend over a wide range.

R-P&C bar stock valves are in stock in globe and angle types, made of bronze, carbon steel, 12-14% stainless steel, combination carbon steel and 12-14% stainless steel and in 18 and 8 stainless steel—in sizes up to 1".

Let us give you complete information about R-P&C bar stock valves. It is contained in a file size booklet—DH-1186. We will be glad to send you a copy.



BOOKLET DH-1186



R-P&C offers you a single responsible source for bronze, iron and steel gate, globe, angle and check valves—cocks and Lubrotite gate valves—bar stock valves—cast steel fittings—D'Este Automatic Regulating Valves.

READING-PRATT & CADY

MANUFACTURERS OF
READING CAST STEEL VALVES AND FITTINGS • PRATT & CADY BRASS AND IRON VALVES
D'ESTE AUTOMATIC REGULATING VALVES

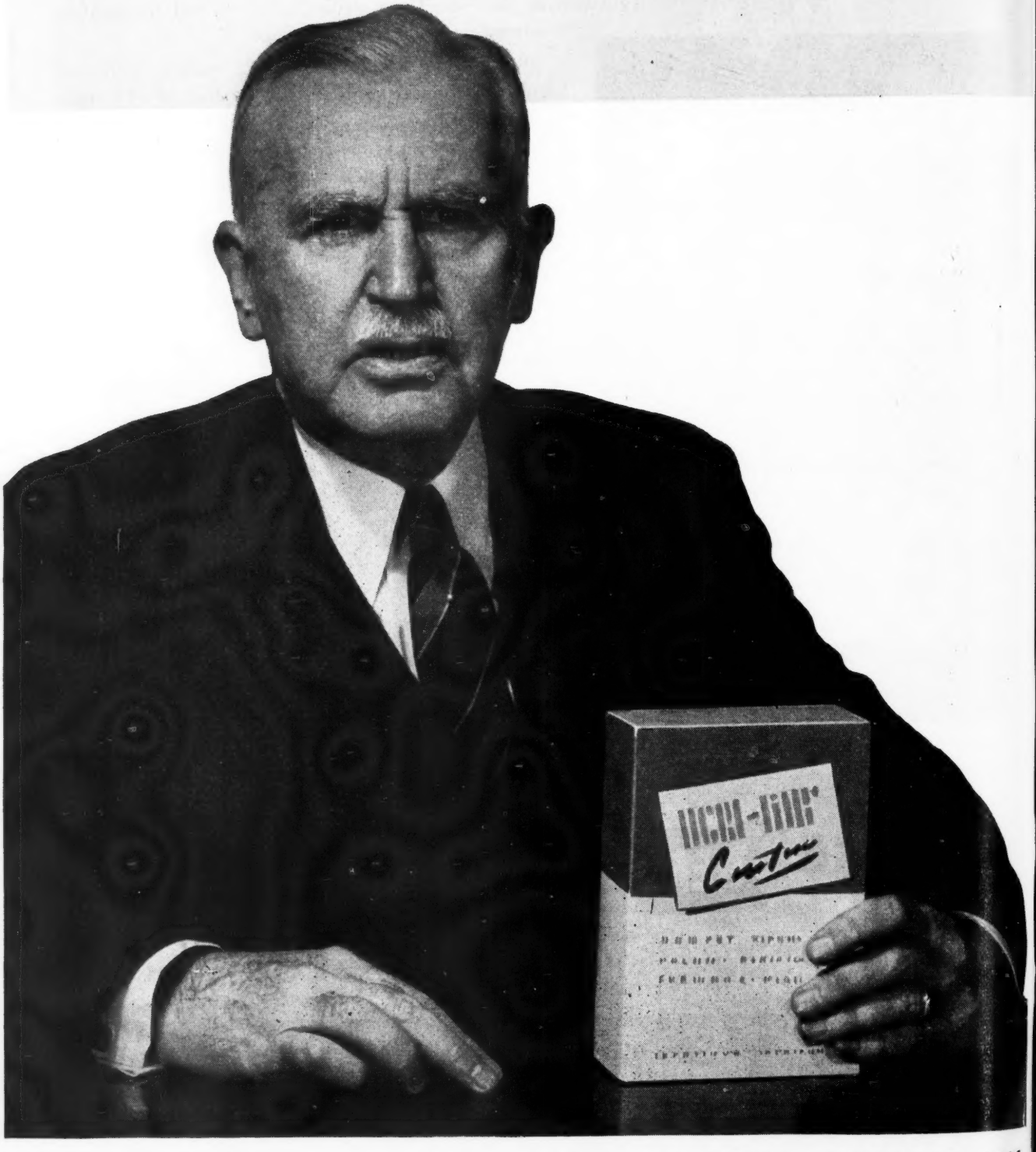
ACCO

Reading, Pa. • Atlanta • Chicago • Denver • Detroit • Houston • Los Angeles • New York • Philadelphia • Pittsburgh • San Francisco • Bridgeport, Conn.

READING-PRATT & CADY DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

"What happens if I vitamin-fortify this



to my label. . .

particular food product?"

"IF CANNED PEAS are vitamin-fortified, can they still be labeled 'peas'?"

"If jam is vitamin-fortified, is it still 'jam'?"

"If tomato juice is vitamin-fortified, is it still 'tomato juice'?"

These are typical questions asked by manufacturers considering fortification of foods.

These manufacturers are naturally concerned about the identity of their products.

When these questions are put to us—as they often are—we do two things:

First, we recommend that the food manufacturer, before taking any preliminary steps to fortify a product, check with the definition and standards of identity for that product as prescribed by the Federal Food and Drug Administration.

Second, we gladly give to the food manufacturer all the facts we know about labeling layouts, and suggest that he further consult with the Food and Drug Administration.

Standard Brands has spent much time and research in the application of yeast products for Vitamin B complex and Vitamin D fortification of foods. We believe we know something about it.

If your company is now considering the enrichment or one or more food products, we shall be glad to aid you with your problems.

We invite you to write direct to the Technical Director, Pharmaceutical Division, who will handle your problem with you in confidence.

Products containing

VITAMIN D

Fleischmann's Hy-Dee
Irradiated Dry Yeast

Fleischmann's Irradiated Dry Yeast
Type 700-H

Standard Brands Viosterol
(Activated Ergosterol) Steenbock Process

Products containing

NATURAL B COMPLEX FACTORS

Fleischmann's
Pure Dry Primary Yeasts *(Brewer's Strain)*

Fleischmann's
Bee-Flex Products

Fleischmann's
Brewer's Yeast Extract Types 3 and 41

Fleischmann's
Yeast Extract and Liver

STANDARD BRANDS INCORPORATED

Pharmaceutical Division • 595 Madison Avenue • New York 22, N.Y.

In packing frozen fruits you have *two* forms of moisture to seal in tightly. Liquid and vapor. And here's a package . . . not yet *thoroughly* tested and proven, we confess . . . that looks like a good answer.

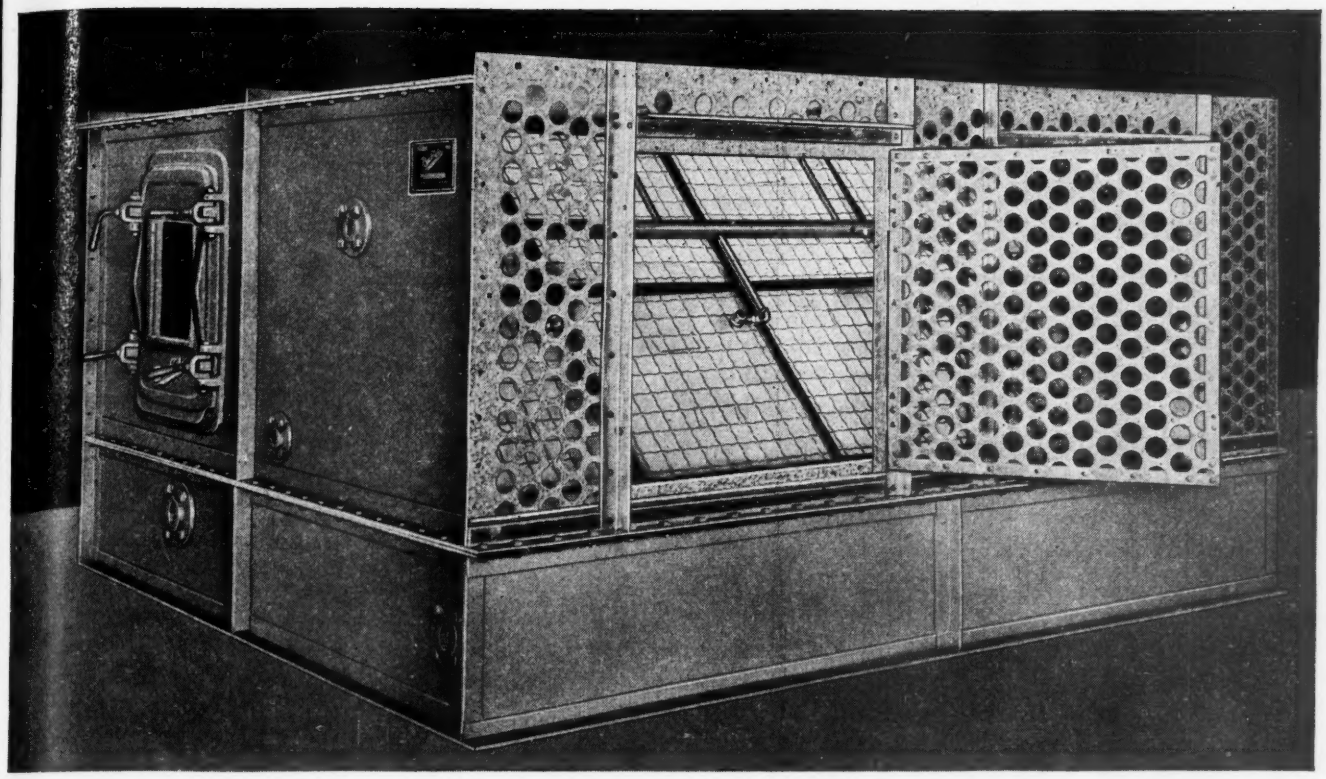
It will be made with Alcoa Aluminum Foil . . . *on the inside.* The foil will be laminated to the carton material and every seam in the carton will be heat-sealed to prevent leakage and retain moisture-vapor at below zero temperatures. Oxidation will be minimized.

It's another example of how package and machinery designers and producers are turning to aluminum foil in developing truly moisture-proof packages. Odorproof and tasteproof, too. And they'll be economical to use.

Alcoa is working closely with Frank D. Palmer, Inc., and other packaging people on these new developments. They may be just what you are looking for. Find out. Write ALUMINUM COMPANY OF AMERICA, 1845 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA

ALCOA ALUMINUM FOIL



Process your Air *for Maximum Efficiency*

Many chemical and food plants, textile mills and similar establishments are enjoying the benefits of "processed air" with Buffalo Wet Glass Cell Air Washers.

This compact, relatively low-priced air conditioning equipment gives excellent results in air-cleaning, humidifying, dehumidifying, heating and cooling. It is easily installed, inexpensive to operate and maintain and practically fool-proof in construction.

Air processed through it provides better working conditions for employees, uniform temperature and humidity for the product and freedom from dust.

Ask for Bulletin—which gives full details.

BUFFALO FORGE COMPANY

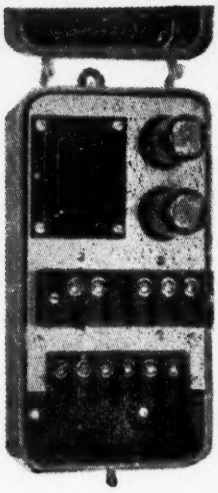
152 Mortimer St. **Buffalo, N. Y.**

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

WET GLASS CELL AIR WASHERS

Automatic Controls
That Save Material and Labor



Faratron Electronic
LIQUID LEVEL CONTROL

prevents overflow waste and emptiness damage. Operated by electronic action, the FARATRON signals or controls the level — high or low — of any kind of liquid at any temperature, in any type of container or processing machine, either open or closed, free or under pressure.

Absolutely safe, absolutely sure, accurate to 1/16th inch. Needs no attention. Write for descriptive Bulletin 144.

LUMENITE INTERVAL TIMER

signals or controls the timing of any program or operation in split seconds to hours. Automatic reset and repeat or manual reset. Dependable, accurate, long-life, heavy duty construction.

Write us your requirements or ask for Bulletin 144T.

Lumenite Electronic Co.
407 S. Dearborn Chicago 5, Ill.

★ ★

NOW PACKAGED TO SELL
BETTER THAN EVER!

They made an instant hit when released to the public after the war. *Now* LA VEL Juices are obtainable in new, improved, more convenient 12 ounce cartons!

Feature the new LA VEL package — 12 ounces of delicious "Frozen Sunshine"!

ORANGE • LEMON
LIME • GRAPEFRUIT

Exclusive distribution franchises are available in some areas. Write or wire for complete information to...

LEAVELL PURE JUICE CO.
PICO, CALIFORNIA

OLDSMOLOY

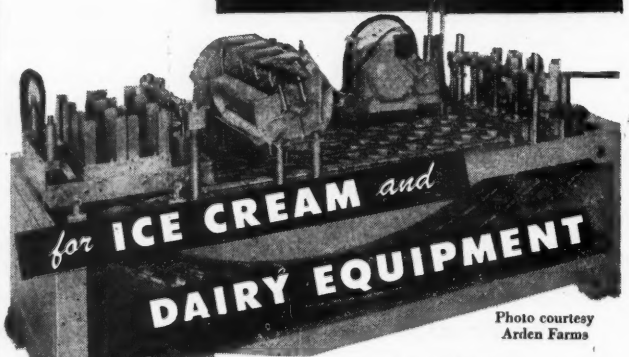


Photo courtesy Arden Farms

The resistance of OLDSMOLOY–the unique white bronze–to the action of lactic acid has made possible the application of this chrome-nickel-molybdenum bronze to many problems in the ice cream and dairy equipment fields. OLDSMOLOY is used successfully for bearings, gears, pump parts, fittings, conveyor chains, sprocket wheels and miscellaneous parts where corrosion and abrasion are factors.

Your difficult problems are invited for detailed consideration and tests.

WRITE FOR BULLETIN giving specifications and applications of OLDSMOLOY to FOOD EQUIPMENT PROBLEMS.

METALS

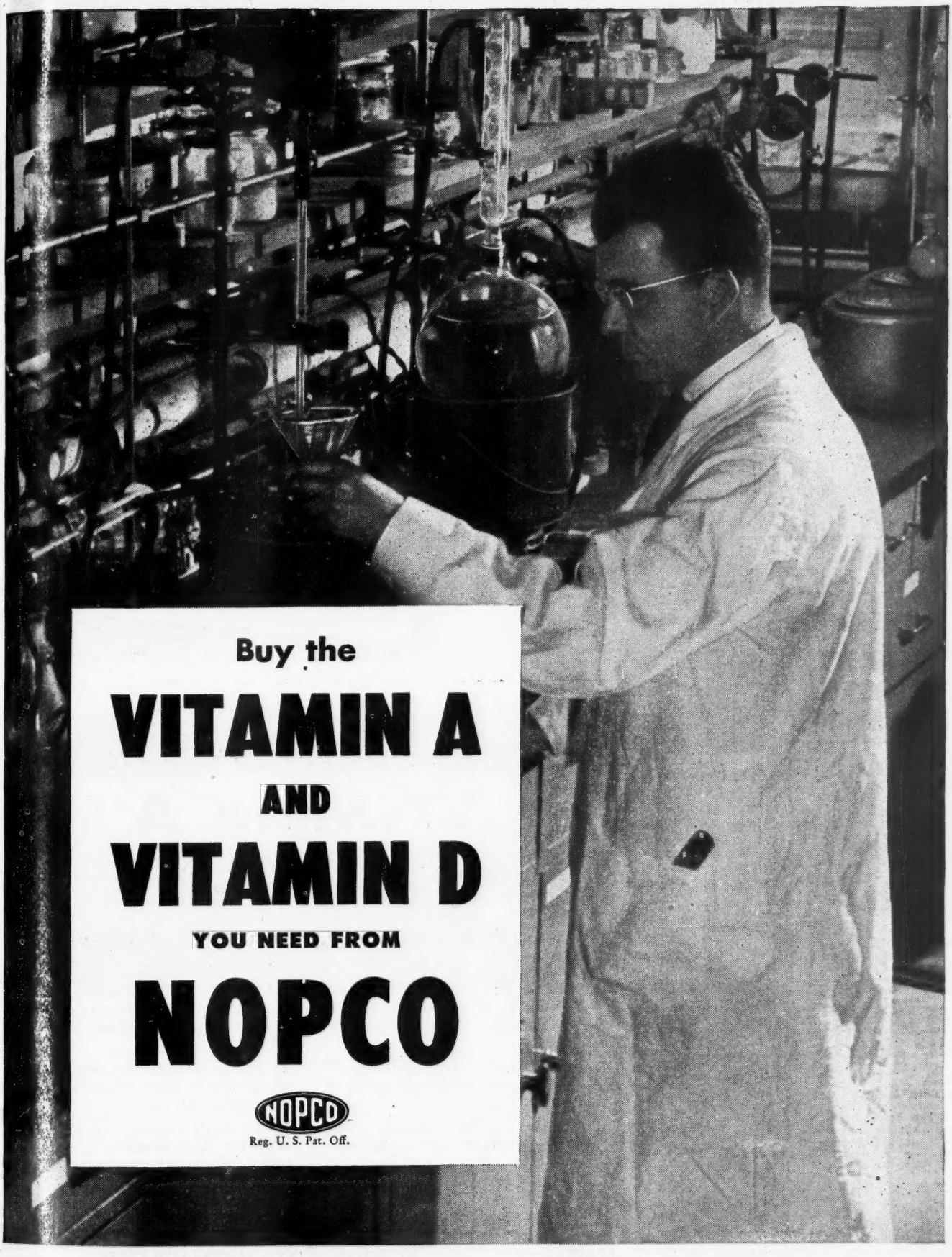
OLDS ALLOYS Company
8686 Rheem Ave. Southgate, Calif.
Suburb of Los Angeles

TIRED OF MINOR LEAGUE SELLING?

● If you don't have brokerage representation, step into the big-time in the vital New York market—with a specialized sales organization that can give a grocery product 100% coverage of this primary area. And if you think it will cost a fortune you are in for a surprise! One of our principals will give you the details any day at your convenience.

NATIONAL FOOD BROKERS ASSOCIATION

MURRAY-ALLEN COMPANY
370 LEXINGTON AVE. NEW YORK 17, N.Y.
TELEPHONE MURRAY HILL 3-5983

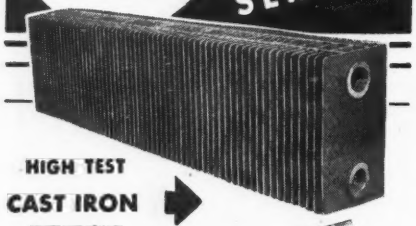


NATIONAL OIL PRODUCTS COMPANY

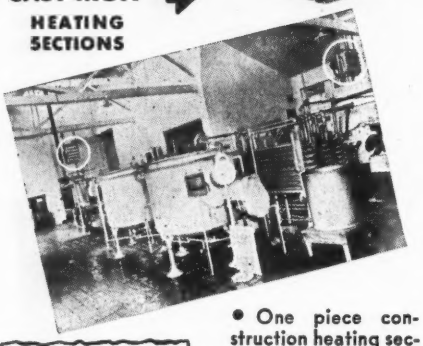
Boston • Cedartown, Ga. • HARRISON, N. J. • Chicago • Richmond, Calif.

Pioneer producers of *natural* Vitamin A and Vitamin D Concentrates and Calcium Pantothenate

HERE'S TROUBLE-FREE HEATING SERVICE



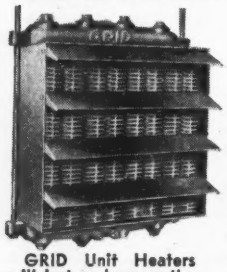
HIGH TEST CAST IRON HEATING SECTIONS



OVERCOMES EXCESSIVE MOISTURES

WITHSTANDS CORROSIVE ATMOSPHERES

- One piece construction heating sections (patented) of high test cast iron that withstand steam pressures up to 250 lbs.
- No soldered, brazed, welded or expanded connections to become loose or develop leaks.
- No electrolysis to cause corrosion, breakdowns, leaks, or heating failures.

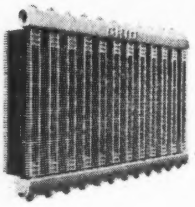


GRID Unit Heaters will last as long as the pipes furnishing steam to them. No other unit heaters have their lasting qualities.

It's the Material That Makes the Difference

Grid High Test Cast Iron Unit Heaters operate efficiently under all atmospheric conditions — without maintenance — in many food processing plants as long as 15 years continuous service.

BLAST SECTIONS



The same high efficiency and lasting qualities as GRID Unit Heaters — no tortuous air passages . . . complete absence of ruptures, strains and working . . . guaranteed for steam pressures up to 250 lbs.

SEND TODAY

New booklet that tells you why corrosion destroys unit heaters—free upon request, together with capacity tables, etc.

D. J. MURRAY MANUFACTURING CO.

Wausau, Wisconsin

INTER-OFFICE CORRESPONDENCE

THE TANGLEFOOT CO., Grand Rapids, Mich.

MEMO TO: Adv. Dept.

Re = DIFUSOLIER Campaign

Finish those layouts! DIFUSOLIER will be in production soon. No time to waste. EJD

Orders are coming in already! Who let cat out of bag? EJD

VITAMIN A IN THE FORM OF CAROTENE

1 Carotene is the International Standard for all Vitamin A activity.

2 Provides natural golden yellow color *and* Vitamin A activity.

3 Has no fishy taste or smell — derived from vegetable sources.

4 Prices greatly reduced, comparable to other forms Vitamin A.

5 Will gain favor for your products with housewives alert to nutritional values.

6 Available for immediate delivery in convenient potencies to meet your requirements.

Write for further data and prices.

TRADE MARK GBI

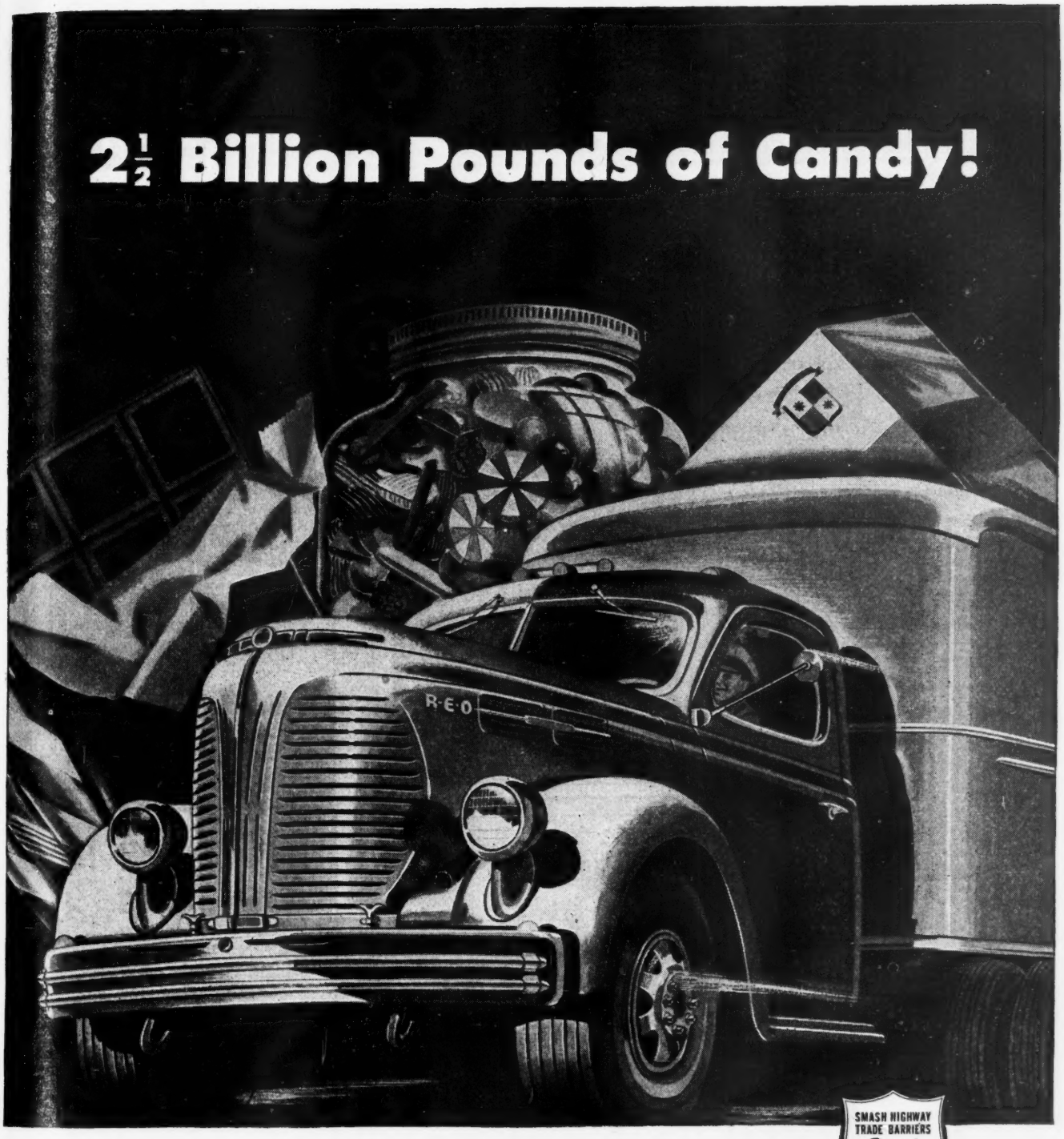
GENERAL BIOCHEMICALS, INC.

DIVISION WYETH INCORPORATED

50 Laboratory Park, Chagrin Falls, Ohio

GOLDEN YELLOW CAROTENE...The Vitamin A Nature Supplies in Fruits and Vegetables

2½ Billion Pounds of Candy!



SMASH HIGHWAY TRADE BARRIERS
Demand reasonable state laws!

Much of the 2,561,000,000 pounds of candy produced in 1943 (latest figures available) went to service men and women, and experts estimate the country could have absorbed another 600 million pounds. Despite sugar rationing and shortages of other ingredients the confectionery industry is doing a sweet job . . . and Reo trucks are helping. Operated by manufacturers and wholesalers, and by the Army and Navy at home and abroad, powerful, economical Reos are speeding the distribution of candy and other foods everywhere. Ask your Reo dealer about the big, new, precision-built trucks and tractors which lead off the Reo line.

REO MOTORS, INC., LANSING 20, MICHIGAN

Factory Branches, Distributors and Dealers in Principal Cities

REO

1904 • AMERICA'S TOUGHEST TRUCK • 1945

MATERIALS
FOR THE FOOD MANUFACTURER

HIGH QUALITY
and
UNIFORMITY
In these Hallmark brands . .

Egg Albumen
Egg Yolk
Potato Flour
Rice Flour
Soya Flour
Pre-cooked Beans
Bread Improvers
Bread Mold Inhibitors
Meat Binders
Stabilizers
Bakers Base (Replaces Tapioca)
Corn Starch
Wheat Starch
Potato Starch
Natural Gums
Pure Food Dextrines

STEIN HALL
285 MADISON AVENUE NEW YORK 17, N. Y.
BOSTON • CHARLOTTE • CHICAGO • DETROIT • LOS ANGELES
NEW ORLEANS • PHILADELPHIA • PORTLAND, ORE. • PROVIDENCE
ROCHESTER • ST. LOUIS • SAN FRANCISCO • TORONTO

PIONEERS VITINC SINCE 1936 TRADE MARK

BASIC A AND D
VITAMIN
MANUFACTURERS

HEADQUARTERS FOR TECHNICAL INFORMATION

VITAMINS, INC.
809 W. 58th ST.
CHICAGO 21, ILL.

VioBin ANTIOXIDANT

An effective antioxidant in concentrations of 0.05 and 0.1%; for animal and vegetable fats.

DEFATTED, DEHYDRATED
PERFECTLY STABLE

WHEAT GERM
CORN GERM

Richer in B complex than original raw germ. Among richest foods known in B complex high quality protein, iron and phosphorus.

VioBin WHEAT GERM Oil

Perfectly stable—requires no refrigeration.

VIOBIN CORPORATION
36 Oak St. Monticello, Ill.
Viobin (Canada) Ltd., Box 50, N.D.G. Postal Station.

CARROT OIL make foods golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.

Carrot oil is preferred for vitamizing foods because it is a natural vegetable oil, and because it contributes vitamin A of high stability and desirable golden yellow color.

Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET

New 36-page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!

NUTRITIONAL RESEARCH ASSOCIATES
201 Broad St., South Whitley, Ind.

WHERE TO BUY

Automatic Control

POWERS TEMPERATURE and HUMIDITY CONTROL

For Industrial Processes, Heating and Air Conditioning Systems, Hot Water Heaters and Shower Baths. **Write for Bulletins.**
Offices in 47 Cities
2789 Greenview Ave., Chicago, Ill.
THE POWERS REGULATOR CO.

Millions More Must Be Fed...

THE food industries are called upon, this year, to produce not only the normal supply for millions of Americans, but for a huge export demand, upping the total requirements by many millions more.

If you produce raw materials that food manufacturers need, your advertisement belongs here, under the heading of MATERIALS FOR THE FOOD MANUFACTURER, where the processors of food, represented by the more-than 14,000 subscribers to FOOD INDUSTRIES turn for sources of supply.

Departmental Staff

FOOD INDUSTRIES
330 West 42nd St., New York City.

HYDROLYZED VEGETABLE PROTEIN
(PLANT EXTRACT)

For better flavors in Soups, Bouillons, Gravies, Sauces and many other food products.

THE HURON MILLING CO.
9 PARK PLACE, NEW YORK (7)
IN BUSINESS OVER 70 YEARS

WHERE TO STORE FROZEN FOODS

QUAKER CITY COLD STORAGE CO.
PHILADELPHIA, PA.
3 WAREHOUSES 3
Proper Temperature For Frozen Foods

Your inquiries to advertisers will have special value . . .

—for you—the advertiser—and the publisher, if you mention this publication. Advertisers value highly this evidence of the publication you read. Satisfied advertisers enable the publisher to secure more advertisers and—more advertisers mean more information on more products or better service—more value—to YOU.

FABLES and FACTS about FOODS and flavors

Copr. 1945 by F. B., Inc., N. Y.

"There is no one who does not eat and drink,
But there are few who really know flavor."

These are not the words of a flavor salesman, but of the great Chinese philosopher and teacher, Confucius, who uttered them twenty-four centuries ago!

—F. B., Inc.—

UNTIL THE WAR between the North and South, peanuts were grown by families in only a few of the Southern States, and then more as curiosities than for eating. It took hungry, underfed soldiers of these Civil War years to discover the nourishing food value inherent in this now most popular nut.

—F. B., Inc.—

IT IS COMMON PRACTICE, today, in China's Kwangsi Province, for the winemakers to throw lizards, salamanders, snakes and even live monkeys into their casks of aging wines. This is supposed to impart a curative potency which is useful in the treatment of ills, aches, rheumatic pains and physical debility in general. Americans who have had the fortitude to sample these wines are frankly skeptical of their cure-all effects. However, they do say that in flavor and bouquet, these wines are quite tolerable!

—F. B., Inc.—

IN BIBLICAL TIMES, taxes were often paid with spices. For example, in the 23rd Chapter of St. Matthew, we read: ". . . ye pay tithe in mint and anise and cummin (cumin) . . ."

—F. B., Inc.—

NOT A TAX ON YOUR PRODUCT, but rather an important advantage to have it flavored with our excellent OIL CUMIN IMITATION. This artificial spice oil has been approved recently by the U. S. Department of Agriculture for use in meat products produced in U. S. Government inspected plants. Similar official action some time ago also permits the use of our OIL NUTMEG IMITATION NOT U.S.P. Wide application in the food field is enjoyed by both of these outstanding oils.

TO PREVENT INDIGESTION, the Romans introduced a spiced cake consisting of meal and anise which was eaten at the end of a rich, heavy meal. They called it *Mustacae*.

—F. B., Inc.—

BUCKWHEAT, extensively cultivated as a bread-corn throughout the Far East, is a native of Central Asia. It is one of the few lawful foods eaten by the Hindus on fast days. In France, due to the fact that it was first brought to Europe by the Crusaders, buckwheat is called "Saracen corn".

—F. B., Inc.—

BUTTERED TEA is the native Tibetan's sole sustaining drink. He brews his tea, breaks in an egg or two and on top of this adds yak butter (which looks like cheese). It's a nourishing and not unpleasant concoction.

—F. B., Inc.—

CANDY MAKING did not begin to emerge from its swaddling clothes until about the middle of the 19th Century with the introduction of candy making machinery.

—F. B., Inc.—

IF ALL THE HARD CANDY FLAVORS sold by our firm during 1944 were used in the manufacture of lolly pops that measured one-quarter inch thick by two inches in diameter, and if these were placed edge to edge in one straight line, they would reach from New York City to Melbourne, Australia and about one third the distance back!

—F. B., Inc.—

SPELLS AND SPIRITS, witchcraft and enchantment were all ineffectual in the presence of angelica. Favored by heavenly patronage, the plant was supposedly a cure for every conceivable malady, even including the plague. Today, the oil distilled from the root and seed of angelica is used principally for the flavoring of cordials, gins and oral preparations.

—F. B., Inc.—

THEN THERE'S THIS IMPORTANT FACT: Our regular list of stock items includes a selection of flavors for every conceivable purpose. What's more, they are all *good* flavors embodying seventy-five years of flavor making *"know how"!*

Est. 1871

FRITZSCHE BROTHERS, Inc.

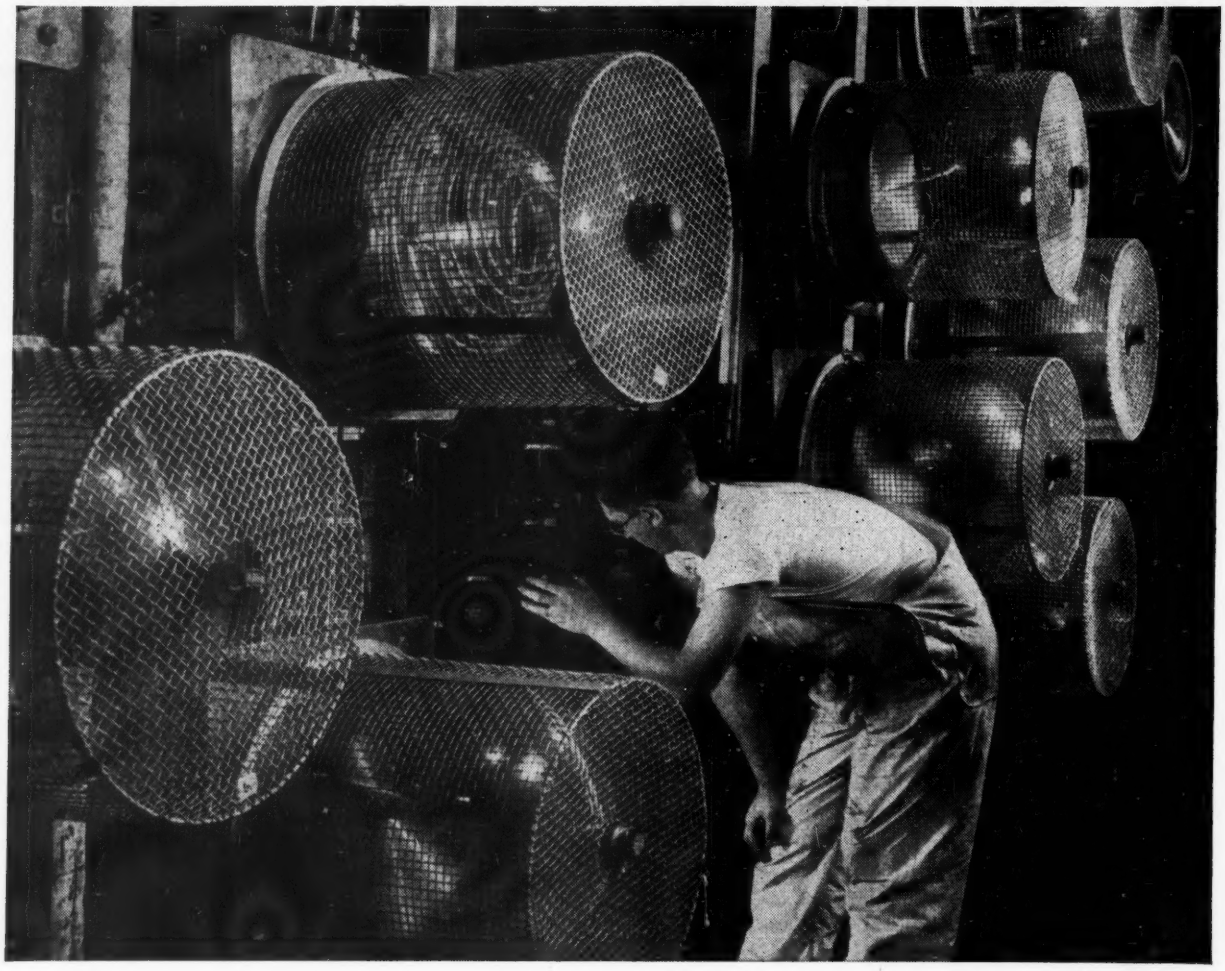
PORT AUTHORITY COMMERCE BLDG., 76 NINTH AVENUE, NEW YORK 11, N.Y.

BRANCH STOCKS

BOSTON CHICAGO LOS ANGELES ST. LOUIS TORONTO, CANADA MEXICO, D. F.

FACTORIES AT CLIFTON, N. J. AND SEILLANS (VAR) FRANCE

THE WHY OF DPI QUALITY



Molecular stills take "the fish" out of Distilled Vitamin A

Though there is no biological connection between fishy taste and odor and vitamin A, raw vitamin A oils betray their source unmistakably.

Problem: how to get rid of "the fish." Solution: Concentrate the vitamin A molecules out of raw oils by the molecular distillation process, leaving most of the taste and odor components behind. Result: DPI Distilled Concentrates of Vitamin A Esters with their natural protective agents intact—markedly superior for blandness, stability, dependable potencies—the right vitamin A for food fortfication.

Do you have complete technical information on our distilled concentrates? Are you receiving our Information Bulletin? We invite you to call or write our nearest office.

DISTILLATION PRODUCTS, INC.

755 RIDGE ROAD WEST, ROCHESTER 13, NEW YORK

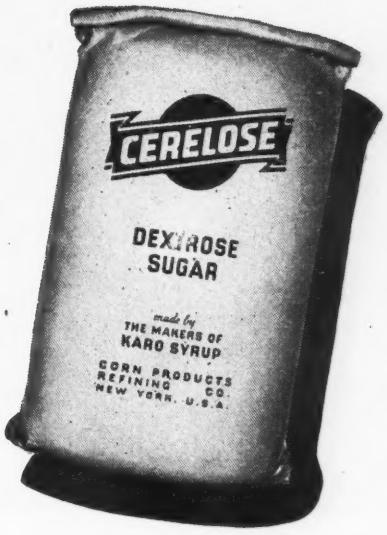
570 LEXINGTON AVENUE, NEW YORK 22, N. Y. • 135 SOUTH LA SALLE STREET, CHICAGO 3, ILLINOIS
PITTS & LOUGHLIN, LOS ANGELES AND SAN FRANCISCO, CALIFORNIA

"Oil-Soluble Vitamin Headquarters"

When you think of the Circus...

...you think of fun

when you think of *energy*...



...think of dextrose sugar

NO ENTERTAINMENT can take the place of the circus. And no food can replace dextrose sugar as the prime source of food energy.

In just a few years, educational advertising of dextrose has been so informative and so consistent that 8 out of 10 people now recognize dextrose as an important ingredient in scores of fine prepared foods.

CORN PRODUCTS SALES COMPANY
17 Battery Place New York 4, N. Y.

CERELOSE *is* dextrose

"*But*--DOES IT HAVE VITAMIN D?"

A favorable answer to this question may be the deciding sales factor for many a food product.

To the modern nutrition-wise mother, vitamin D is important. Surveys show that women know more about vitamin D than any other vitamin. They know that vitamin D is needed by all growing youngsters to help build sound teeth and strong bones. They also know that vitamin D is comparatively rare in natural form . . . can easily be supplied by incorporation in some foods.

It may be possible for you to make available a source of vitamin D . . . and open up an entirely new direction for product improvement and business expansion. It is important to remember that food products in general, although the list is growing, are not as yet extensively fortified with vitamin D.

If you are interested in the nutritional and competitive advantages of fortifying foods with vitamin D, we invite you to write for complete information regarding Vitamin D (A.R.P.I. Process) and its possible use in your own particular food product. There is definite advantage in acting immediately.

General Mills, Inc. *Special Commodities Division*

MINNEAPOLIS 15, MINN. 80 BROAD STREET NEW YORK 4, N.Y.

...CITRIC ACID·TARTARIC ACID·CREAM OF TARTAR·C...

CITRIC ACID · TARTARIC ACID · CREAM OF TARTAR · CITRIC ACID · TARTARIC ACID · CREAM OF TARTAR · CITRIC ACID · TARTARIC ACID · CREAM OF TARTAR · CITRIC ACID · TARTARIC ACID · CREAM OF TARTAR

PFIZER QUALITY

ESTABLISHED 1849

•

Chemicals For Those Who Serve Man's Well-Being

•

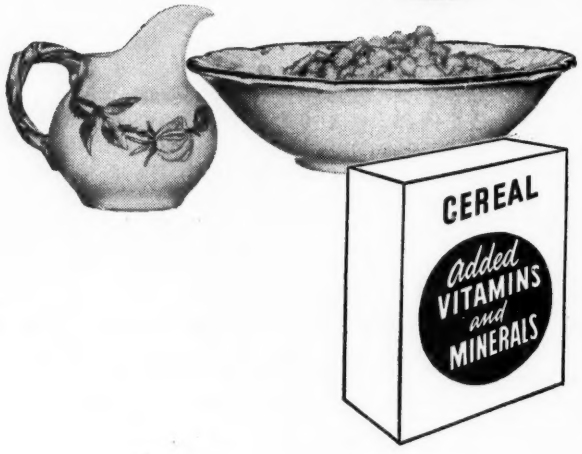
CHAS. PFIZER & CO., INC.

MANUFACTURING CHEMISTS

•

81 MAIDEN LANE, NEW YORK 7, N. Y.
444 W. GRAND AVENUE, CHICAGO 10, ILL.

Cereal as an energy and nutritive food has always been important



...BUT cereal restored to whole-grain levels is BIG NEWS indeed

The American housewife has a new realization of the importance of proper nutrition. Terms like "enriched," "protective food," "vitamins," no longer are a mystery to her. She is reading labels and her comparisons are made more carefully than ever before. She wants the best possible nutritional value.

Product preferences built on the sound basis of better nutrition will inevitably continue. Those products which today are fulfilling the housewife's demands for full nutritional value will continue to be her favorites.

Building lasting preference for your product usually is neither expensive nor difficult. Decisive nutritional advantage often can be obtained by the addition of vitamins and minerals.

The Merck technical staff and laboratories will be glad to help you perfect such factors as adequate distribution and retention of vitamins, and product-control methods.

MERCK
PURE VITAMINS
for the food industry

VITAMIN B_1
(Thiamine Hydrochloride)
Synthesized in the Merck Research Laboratories, 1936

RIBOFLAVIN
(Vitamin B_2)
Made available by Merck & Co., Inc. in 1938

NIACIN
(Nicotinic Acid)
Made available by Merck & Co., Inc. in 1938

ASCORBIC ACID
(Vitamin C)
Made available by Merck & Co., Inc. in 1934

MERCK
ENRICHMENT
service for the milling and baking industries

MERCK ENRICHMENT INGREDIENTS

MERCK FLOUR-ENRICHMENT MIXTURES

MERCK BREAD-ENRICHMENT WAFERS

Merck Bread-Enrichment Wafers are distributed by yeast companies.

Other MERCK products for the food industry

Citric Acid Merck
Lithium Chloride Merck
Cream of Tartar Merck
Lithium Citrate Merck
Sodium Benzoate Merck
Acid Benzoic Merck
Vanillin Merck
Sodium Acetate Merck
Phosphoric Acid Merck
Lactic Acid Merck
Caffeine Merck
Coumarin Merck
Methyl Salicylate Merck
Milk Sugar Merck
Tartaric Acid Merck

... also special iron salts, iodine, calcium, and other minerals used in food processing.

MERCK
FINE CHEMICALS FOR THE PROFESSIONS AND INDUSTRY SINCE 1818

MERCK & CO., Inc. *Manufacturing Chemists* RAHWAY, N. J.

New York, N. Y. · Philadelphia, Pa. · St. Louis, Mo. · Elkton, Va. · Chicago, Ill. · Los Angeles, Calif.

In Canada: MERCK & CO., Ltd., Montreal and Toronto

You can be among the

First

TO GIVE SHELF-LIFE TO PERISHABLES

This water-vapor proof package has proved by actual tests that it can protect fresh fruits and vegetables from evaporation of natural juices over long periods. Tomorrow it will give months of shelf-life to hard-to-keep perishables that ordinarily have only a few days of marketability. Shellmar has pioneered in the development of this and many other outstanding war packages for the safe shipment and storage of food to every fighting front. If you have a problem of protecting freshness, taste and color, contact Shellmar today.

FOR EVERY PRODUCT YOU'LL FIND THE RIGHT PACKAGE AT SHELLMAR

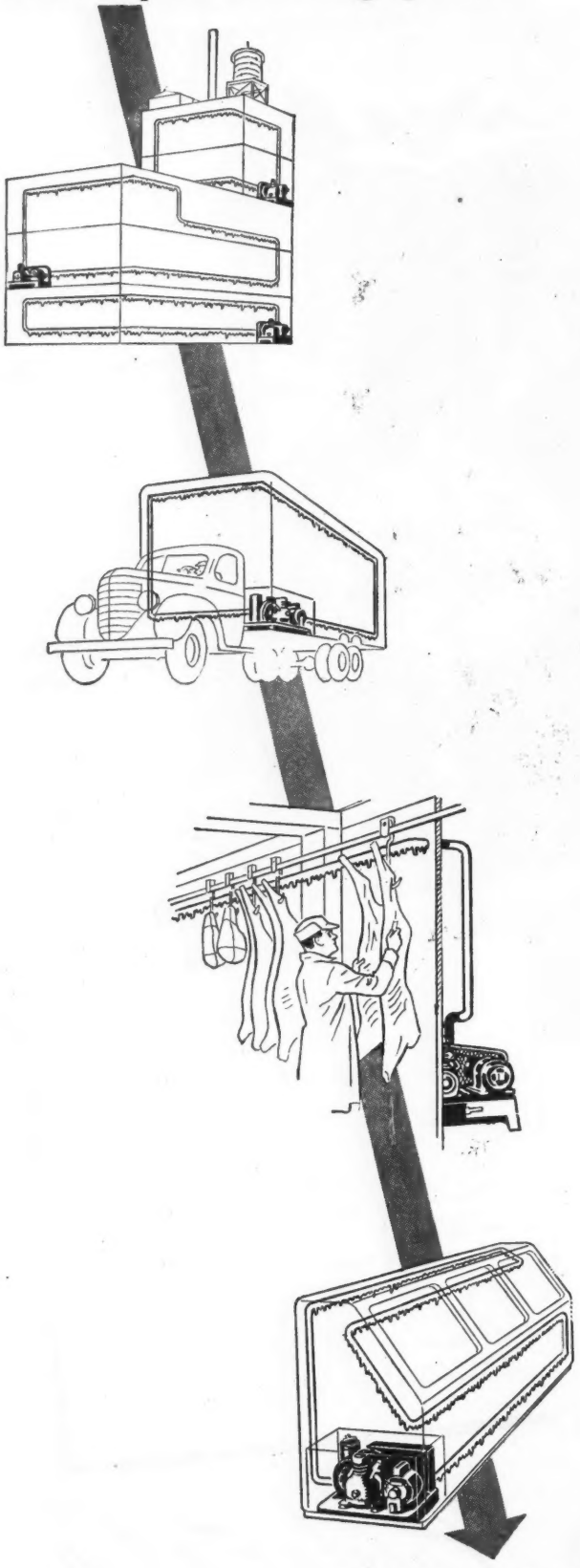
SHELLMAR Products Co.

MT. VERNON, OHIO

Chicago • New York • Pasadena

CONVERTERS OF CELLOPHANE, PLIOFILM, CELLULOSE ACETATE, SARAN, FOILS, PAPERS, GLASSINE, LACQUER COATINGS, VINYLS

From processing plant



YES, IT'S G.E. ALL THE WAY!

Right from the freezing tunnel, through transportation and storage to the display case, you'll find G-E Condensing Units on the job every step of the way!

G-E Condensing Units are built in ratings ranging from 1/6 to 125 hp.—there's a size for *every* frozen foods processing and distribution application. And of course, *all* sizes are skillfully engineered, precision built, thoroughly pre-tested to give you maximum reliability and service life—at low operating and maintenance costs.

Get the facts today!

General Electric Company, Air Conditioning Department, Section 58912, Bloomfield, New Jersey.

GENERAL ELECTRIC

to point of sale . . . it's G-E refrigeration in the Frozen Foods Industry

Now!

. . . more than ever your product should be PACKAGED with *Sales Appeal*

LET *Traver* SPECIALISTS ANALYZE YOUR PACKAGING WITHOUT OBLIGATION!

● Traver engineers—technicians—sales minded designers—combine every phase of packaging know-how—proper protection of product, identification, and above all, sales-punch design! Send us your present package—and we will analyze it, give you our recommendations—with no obligations on your part!

This Idea Boomed Sales!

One hour after placement in stores, a newly designed cellophane wrap gave a product sales preference over competition on the market for 30 years, and in some cases, leadership in its field within 30 days!

Traver CORPORATION

PACKAGING THAT SELLS!

Convertors of CELLOPHANE—GLASSINE, FOILS, PROTECTIVE PAPERS
Manufacturers of LOXTITE partitions

358-368 West Ontario Street, Chicago 10, Illinois
122 East 42nd Street, New York City, New York

MAIL COUPON NOW!

TO TRAVER CORPORATION, Dept. FI 12-45
358 W. Ontario Street, Chicago 10, Ill.

● Without obligation, we would like counsel from your packaging engineers and designers. We enclose our present package (or) description of new product is attached.

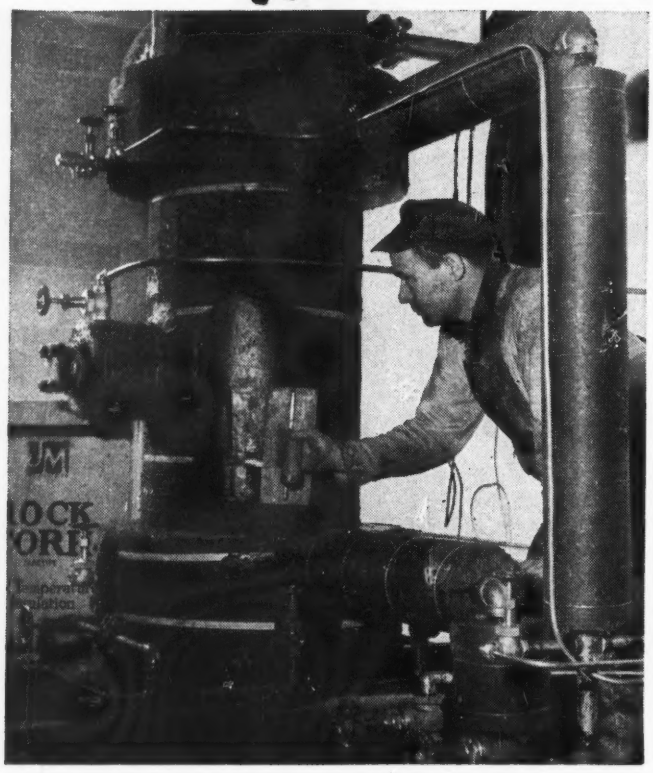
Signed_____

Company_____

Street_____

City_____ State_____

Tricks of the trade



It's the *Knack* of the skilled mechanic that makes the difference in an insulation job.

THERE is an art to applying insulations properly—and only experienced applicators know the many little practices that make for success.

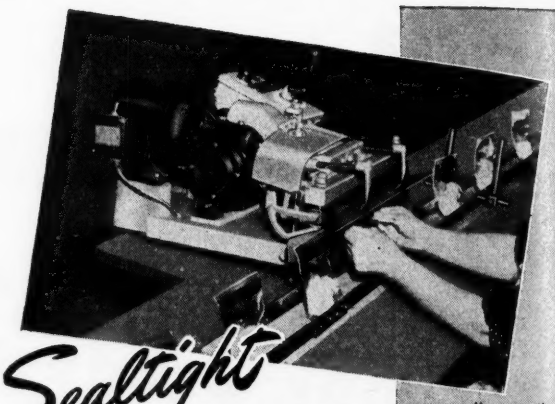
Johns-Manville places a trained force of workmen and engineers at your call—men capable of handling your insulation job from planning through application. In some areas, the organization is J-M's own construction force—in others, it's a J-M Technical Service Unit.

Because of its many advantages, J-M Rock Cork is preferred for low-temperature insulation by leading refrigeration engineers. Among the outstanding features of this basically mineral insulation are its low thermal conductivity, resistance to moisture and ease of installation.

For details about Rock Cork, write for brochure DS-555. Johns-Manville, 22 East 40th St., New York 16, N. Y.

And . . . remember an insulation's performance is only as good as its application.

JM JOHNS-MANVILLE
ROCK CORK



Sealtight
THE ORIGINAL
BAG HEAT SEALING MACHINE...

NEW "PACER" MOTOR DRIVEN MODEL

Offers: (1) Automatic Folding Mechanism. (2) Hydraulic Type Thermostatic Heat Control. (3) Date Coding Attachment. (4) Hole Punching Attachment. (5) Special Model for Large Bulky Bags. (6) Will Use Any Type of Heat Sealing Bag Material. (7) Precise, Sturdy Construction. (8) 12 Years of Experience Exclusively in the Production of Crimp Heat Sealing Machines.

MODEL 12 F (FOOT POWER) AVAILABLE FOR IMMEDIATE DELIVERY

WRITE FOR CATALOG SHOWING FULL LINE INCLUDING MOTOR DRIVEN MODELS

HEAT SEAL-IT COMPANY
4316 W. PARRISH ST., PHILADELPHIA 4, PA.

HAND SCOOPS & DIPPERS

FOR CHEMICALS AND ACIDS

Made of Monel Metal or Stainless Steel

Both the Hand Scoops and the Dippers come in from 1 to 4-quart capacities.

The above are representative of our line of low-priced TERRISS Stainless Steelware which includes:

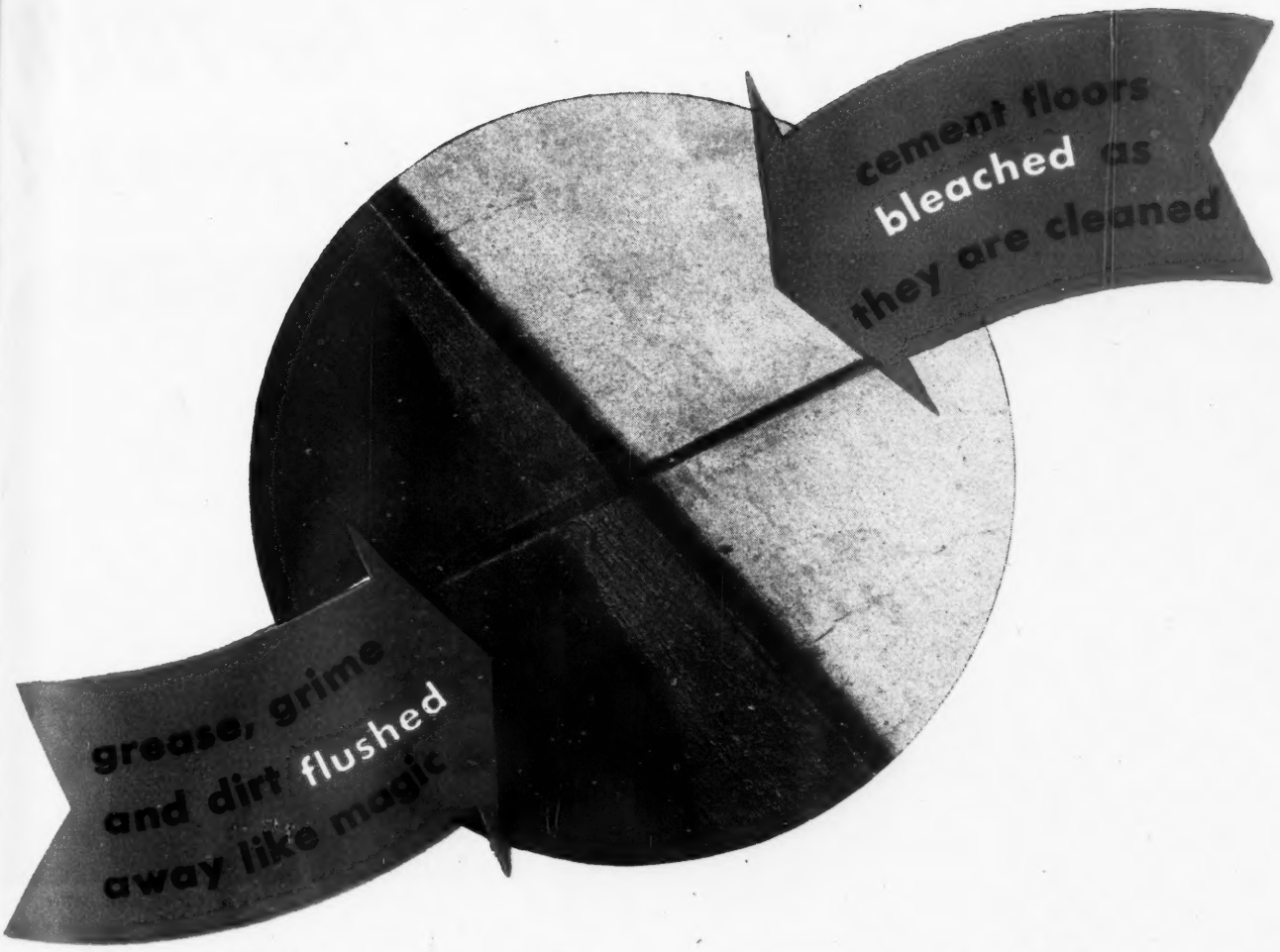
We carry a full line of Filter Paper. Also, Hose for all purposes. Send us samples of your needs.

SHEET STAINLESS STEEL: Open and closed tanks, with or without mixers, batch cans, funnels, measures, pails, evaporating pans, etc.

CAST STAINLESS STEEL: Sanitary fittings, water filters, syrup filters, strainers, piping and tubing. Also, we can fabricate to meet your specifications.

Send for complete information.

CONSOLIDATED
SIPHON SUPPLY CO., INC.
DEPT. F. 22-24 WOOSTER ST. NEW YORK CITY



Turco Aktiv, a cement cleaner that penetrates pores . . . brings dirt to the surface!

The grease, grime and dirt on cement floors vanish like magic when Turco Aktiv goes to work. Not only does this remarkable cleaner speedily and thoroughly emulsify greases and oils, but it also provides, under continued use, a bleaching action that will make cement floors, walks and driveways gleam.

Through *Surface Chemistry;** Turco Aktiv penetrates deeply into pores and cracks which are ordinarily uncleanable. The dirt is brought to the surface where cold water will flush it away without a trace. Turco Aktiv is easily and quickly applied, and does the job without scrubbing or scraping. A mop, a bucket and a hose are all the equipment you need.

A granular material, Turco Aktiv is safe and pleasant to use. Since it dissolves completely in water, it may be made into a stock solution for immediate use. Or sprinkle Aktiv on a wet cement surface and, in a few minutes, lightly work it into cracks and rough spots with a broom or brush. Then hose it off or mop with clear water—and one of the toughest, hardest cleaning jobs is easily and quickly done. Write Turco, Dept. FI-12.

**This is Turco Surface Chemistry*

Surface Chemistry is the scientific balance and application of these cleaning factors to a specific problem.

© 1944 TURCO PRODUCTS INC.

WA—Wetting Action
EA—Emulsifying Action
SV—Saponifying Value
SA—Solvent Action
CA—Colloidal Activity
WC—Water Conditioning
BI—Buffer Index
pH—Energy of Alkalinity
TA—Total Alkalinity
RE—Research and Experience, the combining factor that puts all the above elements into balance and to work on your specific problem.

TURCO TURCO

INDUSTRIAL CLEANING COMPOUNDS

TURCO PRODUCTS, INC. Main Office & Factory: 6135 S. Central Ave., Los Angeles 1
Offices & Factories: 125 W. 46th St.- Chicago 9 - 1606 Henderson St., Houston 1, Texas
New York Office: 415 Greenwich St., New York 13 - Offices & Warehouses in All Principal Cities

Better Trucks for YOUR Business!

Ford Service "Keeps Costs Down, Keeps Trucks on the Job"

In handling perishable foods, reliable transportation equipment is of first importance. That's why so many food processors prefer Ford Trucks. Mr. R. T. Restemeier of the Restemeier Potato Chip Co., Cleveland, Ohio, operating a fleet of 53 Ford Trucks wrote us:

"We handle over a quarter-million bushels of potatoes a year, and Ford equipment hauls it all, from carrying loads of 10 to 12 tons on semi-trailers to delivering our finished product. We have found the Ford Engine and Parts Exchange Plan not only saves maintenance money but keeps our operating costs down and keeps our trucks on the job."

The new Ford Trucks bring you further assurance of traditional Ford reliability. They have many important new engineering advancements designed to save you money on gas, oil and repairs. Let your Ford Dealer show you these new trucks, already available in more than forty distinct models and types, offering a choice of two great engines—the new 100 H.P. V-8 and 90 H.P. Six.

Ford

ADVANCED ENGINEERING IN NEW FORD TRUCKS

More Economy and Endurance
Easier Servicing

A STILL GREATER 100 HP V-8 ENGINE with NEW Ford steel-cored Silvaloy rod bearings, more enduring than ever in severe service • NEW aluminum alloy cam-ground 4-ring pistons for oil economy • BIGGER, more efficient oil pump and IMPROVED rear bearing oil seal • NEW longer-lived valve springs • NEW improvements in cooling • NEW efficiency in ignition • in carburetion • in lubrication • in ease and economy of servicing operations • And available in all truck chassis except C.O.E. units—the rugged, thrifty 90 HP FORD SIX-CYLINDER ENGINE, with many important advancements.

FORD CHASSIS ADVANTAGES: Easy accessibility for low-cost maintenance • Universal service facilities • Tough, forged front axles • Extra-sturdy rear axles with pinion straddle-mounted on 3 large roller bearings, ¾-floating type in light duty units, full-floating in all others • 3 axle ratios available (2 in 1-ton unit) • 2-speed axle available in heavy duty units at extra cost • Powerful hydraulic brakes, large drums, cast braking surfaces • Rugged 4-speed transmission with NEW internal reverse lock optional at extra cost on light duty units, standard on all others.

FORD TRUCKS

MORE FORD TRUCKS ON THE ROAD • ON MORE JOBS • FOR MORE GOOD REASONS

Thousands of food products owe their shelf-life freshness and taste values to protective packaging papers by **RHINELANDER**

COFFEE OWES ITS TASTE-LIFE TO PROTECTIVE PACKAGING

Favorite beverage of millions—coffee owes its popularity to unique taste qualities which in turn are dependent on freshness. To maintain a peak of excellency in coffee as with other packaged food products has necessitated a special type of protective covering—a non-porous, strong and flexible material for bags, wrappings and liners. Such are world-famous Rhinelander Protective Papers. Born of fibre from hardy trees selected in America's Northlands, they inherit enduring stamina for carefree, economical conversion and usage. Many other products such as cereals, bakery goods, candies, tobacco and drug items also depend upon these papers for long shelf-life and retention of original flavor and potency. Every maker of products that possess variable qualities subject to time and environment will find dependable guardians of quality in *all* Rhinelander Protective Papers.

RHINELANDER *Protective Packaging* PAPERS

Moisture/Vapor-Proof Coated Glassines
Wet Strength Glassines
Wet Strength Greaseproof
Heat Sealing Coated Glassines

Lard and Shortening Liners
Packing Industry Wrappings
Genuine Greaseproof
Specialty Bag Papers

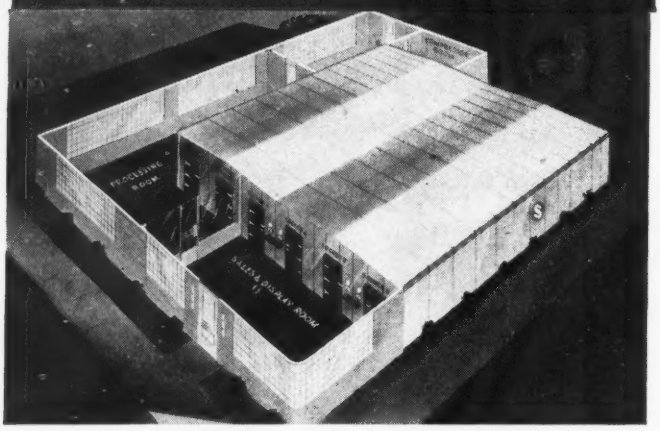
Confectionery Papers
Cereal Wrapping Papers
Coffee Bag Papers
Cracker Box Liners

Laminated Greaseproof Papers
Wax Laminated Glassine
Greaseproof Innerwraps
Opaque Label & Bag Glassine

RHINELANDER PAPER COMPANY • MILLS AT RHINELANDER, WISCONSIN, U.S.A.

Salem

PRE-FABRICATES LOCKER PLANTS



TO HELP YOU INCREASE YOUR BUSINESS

Whether you are a newcomer or an "old hand" in the locker plant business, you can use pre-fabrication profitably.

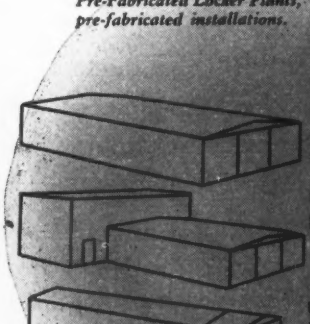
Here's how pre-fabrication provides diversified opportunities to expand your frozen food storage business quickly and easily.

(1) establish branch or neighborhood plants serviced from a central processing source.
(2) increase the capacity of your overcrowded plant.
(3) build a new, economical locker plant.

The Salem Pre-Fabricated Unit (40 ft. long, 10 ft. high, 8 ft. wide) is a self-contained, weather-resisting metal building, fireproof and verminproof. A two-man crew can easily join the patented steel sections.

Salem and only Salem can give you choice of Automatic or Walk-In, in either custom-built or Pre-Fabricated. A Locker Plant is a long term investment. Careful engineering pays dividends.

Write Salem today for the new booklet—"Facts and Figures About Pre-Fabricated Locker Plants," also full color illustrations of typical pre-fabricated installations.



Three pre-fabricated units (360 automatic lockers) side by side. Each unit is 40 ft. long, 10 ft. high, and 8 ft. wide.

★

This illustrates how you can use Salem's pre-fabricated units to enlarge your present store or locker plant.

★

Here is a single pre-fabricated locker unit (120 automatic lockers), ideal for enlarging your present food store or locker plant, or establishing a branch or suburban locker plant.

SALEM ENGINEERING CO. · SALEM, OHIO

Refrigeration and Air Conditioning Division

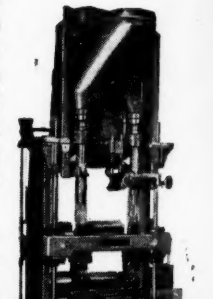
SALEM ENGINEERING LTD. (CANADA) TORONTO, ONTARIO

TO YOUR UNCLE

The old gentleman with the whiskers—ever mindful of the welfare of his boys—placed the entire output of S & S filling, packaging and wrapping machines under priority regulations. They were used for filling nearly everything from K-rations to D.D.T. powder.

Over night the war ended. There we were—cleaned out—not a machine in stock, no parts on hand . . . and orders descending upon us in a flood.

Today the material situation is improving though castings are still hard to get. We'll take care of you just as quick as we can turn out machines, but it will take a little time. With production facilities increased and manpower augmented, we assure our customers that we are doing all possible to expedite filling of your orders.



An S & S machine is *worth waiting for.* Shown here is the Transwrap Packaging machine. It forms, fills and seals. Uses cellophane or other heat sealing films. For salted nuts, candies, small crackers, powders and individual pieces.

S & S make the right machine for the right job. Full information gladly supplied on request.

STOKES & SMITH CO

4911 SUMMERDALE AVE., PHILADELPHIA 24, U.S.A.

FILLING-PACKAGING-WRAPPING MACHINES

Speeds to suit your needs — 15-30-60-120 per minute

TODAY'S *Merchandising Trends**

1. ***self-service***
2. ***convenience***
3. ***brand emphasis***
4. ***protection***
5. ***informative labeling***

* *Based on authoritative surveys of both consumer and retailer preferences.*

Self-service stores want it Packaged!

The swiftly moving trend toward self-service in retail food stores, as well as in many other type stores is recognized by all who are familiar with present-day merchandising.

Packaging has been the very essence of this development and will continue to be the major factor in self-service stores.

It is, therefore, imperative that your product is packaged to compete for consumer attention with all the color, eye-appeal, and display value it needs to do a SELF SELLING job.

Milprint specializes in designing packages that LEAD THE TRENDS. Consult us today — for better sales with better packages.

Printed Cellophane, Pliofilm, Glassine, Aluminum Foil, Vinyl, Lacquer coated and Laminated Papers in all forms, including Sheet Wraps, Rolls, Pouches, or Specialty Bags, Revelation Bread Wraps, Specialty Folding and Window Cartons, Counter Displays, Simplex Pie and Cake Units.

MILPRINT

PACKAGING CONVERTERS, PRINTERS, LITHOGRAPHERS

MILPRINT, INC., MAIN OFFICES - MILWAUKEE, WIS.

★ SALES OFFICES AT • NEW YORK • CHICAGO • BOSTON • SAN FRANCISCO • PHILADELPHIA • GRAND RAPIDS • LOS ANGELES • CLEVELAND • DALLAS • MINNEAPOLIS • CINCINNATI • ATLANTA • PITTSBURGH ST. LOUIS • INDIANAPOLIS • KANSAS CITY • MEMPHIS

116

Glycerine *Rates High In New-Product Planning*

—Here's Why!

GLYCERINE, known to so many chemists in so many different fields, is high on the list in plans for new products because it has *the right combination of properties.*

For instance, its *viscosity* is high and uniform. Its high degree of *permanence* is of value in many industrial fields. Its *wholesomeness* is proved in foods, confectionery, ice cream, cosmetics, drugs, transparent wrappings. It is useful for this reason in textiles, too, especially where products touch the skin.

The *chemical reactivity* of glycerine is an advantage—in the making of alkyd resins and monoglycerides for paints; ester gum for varnishes; polyglycerols and chlorohydrins valuable in the food, drug, and resin industries.

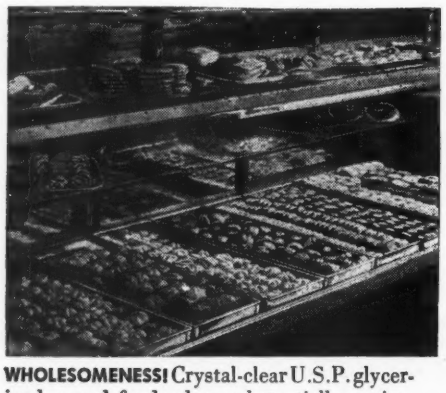
The *humectancy* of glycerine is another advantage—in the processing of tobaccos, as an ingredient in cosmetics, foods, confectionery. Few materials offer such a *combination of properties* advantageous to the manufacturer.

Perhaps glycerine can be of value to *you.* For further information, write: Glycerine Producers' Association, **K-1,** 295 Madison Avenue, New York 17, N. Y.

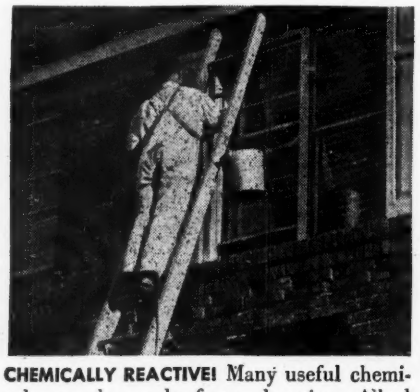
Research Laboratories, Chicago, Ill.

HIGH VISCOSITY! The viscosity of glycerine is a standard. That is one of many reasons why this pure, wholesome, versatile material is so valuable in the making of *cosmetics,* such as leg make-up, creams and lotions.

LONG LASTING! Glycerine helps to give products long life—keeps them from drying out easily. Think of glycerine when you plan new products.

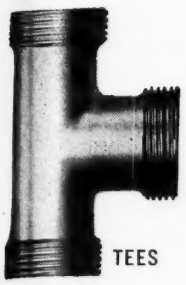


WHOLESOMENESS! Crystal-clear U.S.P. glycerine has real food value, substantially equivalent to carbohydrate. Naturally sweet. Use it in *cakes, candies, soft drinks, flavorings!*

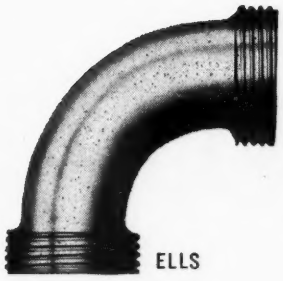


CHEMICALLY REACTIVE! Many useful chemicals can be made from glycerine. Alkyd resins, ester gum, monoglycerides, polyglycerols, and chlorohydrins are a few.

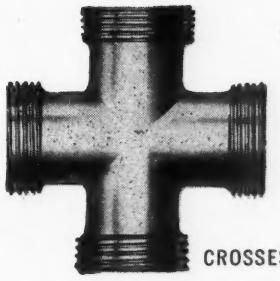
HUMECTANCY! Glycerine solutions do not markedly differ from glycerine itself in humectant powers. A little goes far. To keep a product like *tobacco* moist, use glycerine.



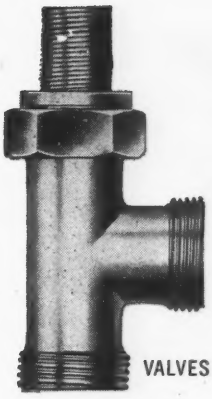
TEES



ELLS



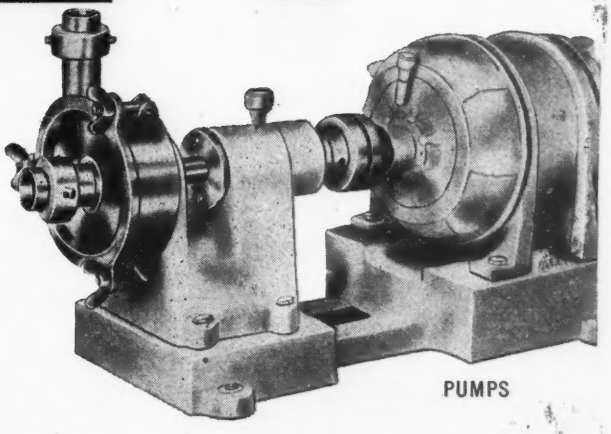
CROSSES



VALVES

INDUSTRIAL STEELS, INC.

FERRULES



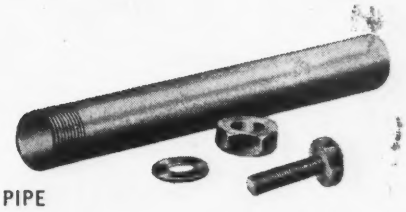
PUMPS

can supply you at Once

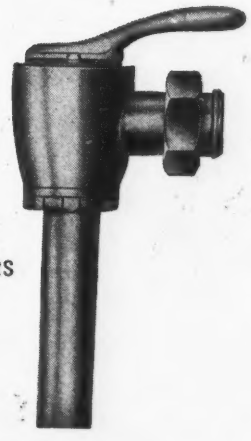
with these and other Stainless Sanitary Fittings

★ From one source...INDUSTRIAL STEELS, INC., you can get without delay all of these stainless sanitary fittings, in all standard sizes...and also any other standard stainless shape, sheet, hardware or welding electrodes.

There is no price premium for this service. When you need *anything* in stainless, have your order filled completely and promptly by INDUSTRIAL STEELS, INC. Just one call can do it all. JMLCo C1-M2



PIPE

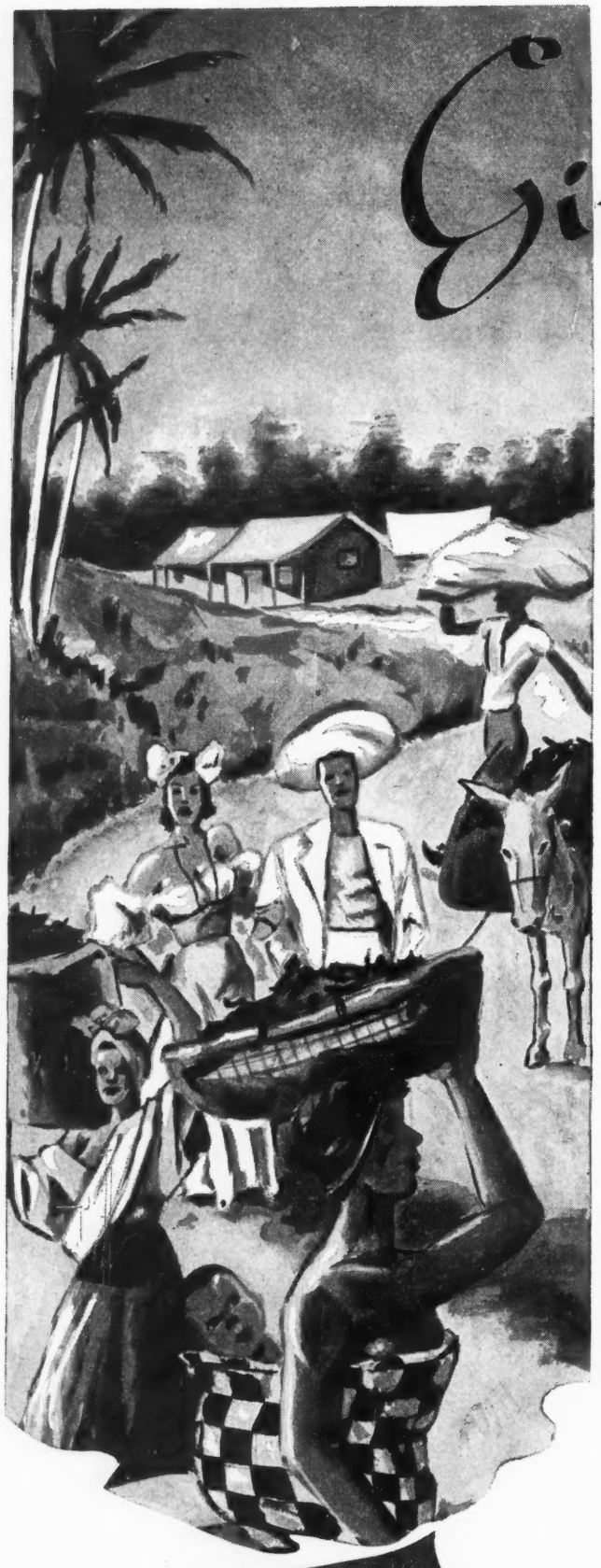


CAN FILLERS

Everything in STAINLESS

INDUSTRIAL STEELS, INC.

271 Bent Street, Cambridge 41, Mass.
TROwbridge 7000 • Teletype: Cambridge 547



Ginger

Ginger, the root of the herb Zingiber, seems to grow wherever the sun shines hot and long—in Jamaica, Africa, Sumatra, India, China and the Malays and is one of our most important spices. It is named after either the port from which it is shipped or the country where it grows.

Ginger is one of the earliest of the Oriental spices known to Europeans, even familiar to the Greeks and Romans, and it was well known in England long before the Norman conquest. Marco Polo saw it growing in China, Malabar and Sumatra in the late 13th Century and it was brought to America soon after the discovery of the New World, before any other Oriental spice. From here it was taken in the 16th Century to Jamaica where today by far the best Ginger is produced.

Jamaica Ginger is a long-fingered, very thin root, but its flavor is known as the finest of all Gingers, unequalled for fancy baking and for candy and extract manufacturing.

There are two forms in which ginger is usually prepared for the market, dried or cured ginger and preserved or green ginger. In Jamaica and India the spice is prepared as dry ginger, while China supplies practically all of the preserved ginger.

Cream of Spice Ginger

The Stange patented process of natural spice extraction retains all the natural tangy flavor of pure Ginger. The Stange science of seasoning produces higher standards of spice flavor, new techniques of blending and by standardizing the strength, purity and quality of flavor obtained from NATURAL spices and by utilizing ALL of the available flavoring substances, Stange has put FLAVOR CONTROL IN LARGE SCALE PRODUCTION UNDER LABORATORY CONTROL. Cream of Spice (C.O.S.) is nature's best put in a form most suitable for use in your products.

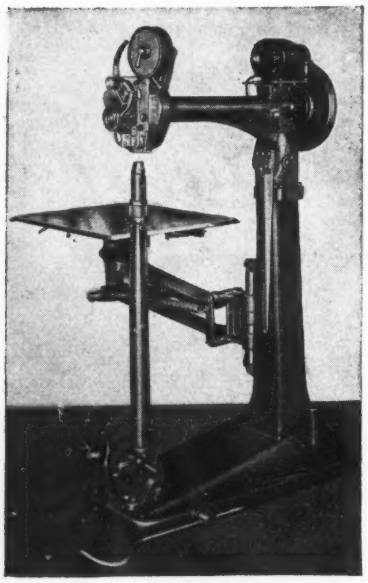
Stange's
CREAM OF SPICE

• WM J. STANGE CO. •
2540 W. MONROE ST. CHICAGO 12, ILL.

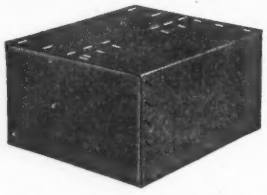
SEASONINGS

IMPROVED PRODUCTION...
right up Alvey's Alley!

That's why the products of leading Food Industries move on...



Set Up for Bottom Stitching



BLISS TOP *and* BOTTOM STITCHER

Corrugated or Solid Fibre Containers Are Stitched Both TOP and BOTTOM on This STITCHER

TOP and BOTTOM Stitched Containers are now specified for packing numerous products. On this Stitcher the bottoms of containers may first be wire stitched, then filled and the tops sealed with wire stitches.

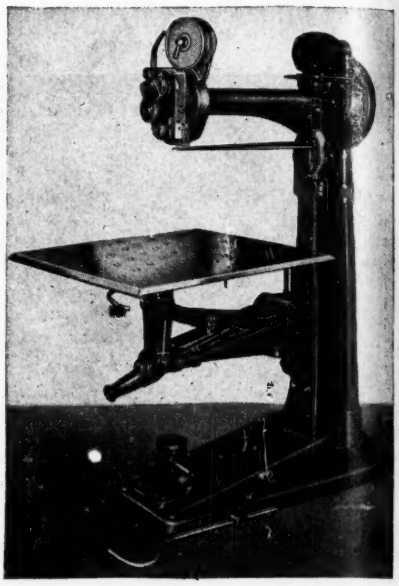
The illustration at the left shows the machine set up for bottom stitching of containers.

For top stitching of filled containers, the post is removed and table and blade anvil swung into position as illustrated at right. Less than one minute is required to make the change.

The counterbalanced table is quickly adjustable for varying heights of boxes.

Built in two sizes, with 15″ and 25″ throats and 26x30″ work table. Handles boxes up to 25″ in depth. Standard Bliss Heavy Duty Stitcher Head is used. Motor ¼ HP.

Wire Stitching both top and bottom provides a uniformly secure closure and gives added strength and rigidity to the case.

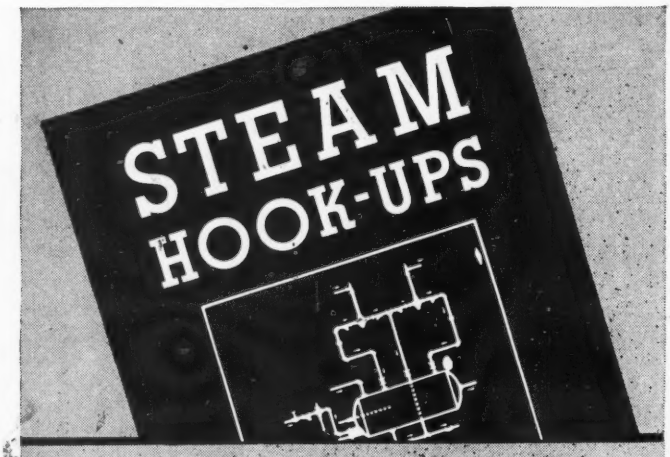


Set Up for Top Stitching

Write for further information.

DEXTER FOLDER COMPANY, 330 West 42nd Street, New York 18, N. Y.

Chicago: 117 West Harrison Street Philadelphia: 387 Bourse Building Cincinnati: 1335 Paxton Street



STEAM HOOK-UPS THAT SAVE

The Sarco Hook-up Book is the "bible" for about 40,000 steam engineers who have asked for a copy because it tells where to use steam traps and temperature control, what kinds and sizes to select, and how to hook them up.

Among the contributors to its contents are the thousands of Sarco users who have demonstrated all kinds of ingenuity in finding new ways to save with Sarco. Your copy will be sent promptly. Please use your company letterhead.

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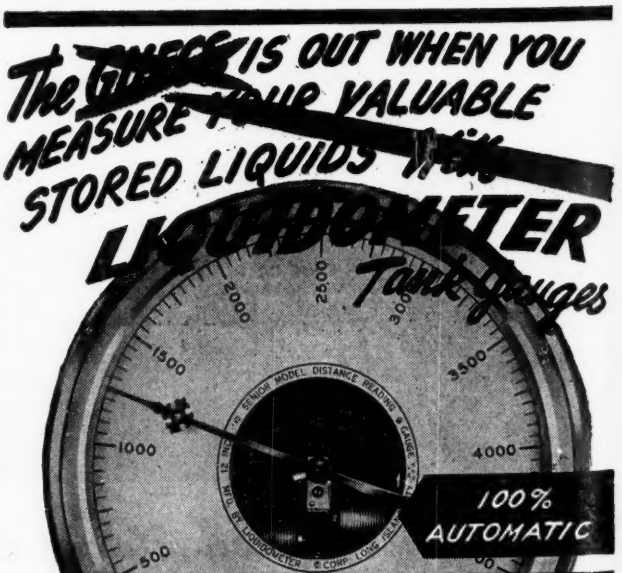
SARCO SAVES STEAM

SARCO COMPANY, INC.
475 Fifth Avenue, New York 17, N. Y.
SARCO CANADA, LTD., 85 Richmond St. W., TORONTO 1, ONT.



"LIQUIDS WORTH STORING ARE WORTH MEASURING"

THE LIQUIDOMETER CORP.
38-14 SKILLMAN AVE., LONG ISLAND CITY, L.N.Y.

HINKY-DINKY Puts Meals on Wheels WITH FRUEHAUFS

EVERYTHING from fruit cocktail to demi-tasse — fruits, vegetables, meat, and all kinds of groceries — ride to the 38 Hinky-Dinky markets in Fruehauf Trailers, operated by Merchants Wholesale Grocery Co., of Omaha.

Back in 1936, the company bought its first Fruehauf. Soon they discovered that this Trailer was doing the work of two or more trucks, and added more units. Today, the fleet is 100% Fruehauf —the latest addition being a 22-foot model. Now, only 5 trips each week handle the job.

Loads are heavy — from 13 to 15 tons. Deliveries in all kinds of weather must go through, to meet customer demands.

On many runs the Trailers work both ways. Outbound, these loads go directly to the stores—returning, they pick up fresh eggs from farmers, flour from mills, canned goods from canning plants, meat from packers, and always empty boxes and useful containers.

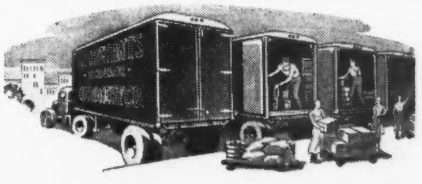
All of Merchant's Fruehaufs are insulated refrigerator vans — so essential in maintaining Hinky-Dinky's good reputation for fresher foods, even when the mercury soars to withering heights.

Wholesalers, like Merchants Grocery Co., have found real economy in the Trailer method. It has been a most important factor in the expansion of their business. Perhaps you have a hauling problem in this, or a different line. In any event, before you consider the purchase of new equipment—let a Fruehauf man give you the complete Trailer story. Most likely, it will save you many dollars as it has for others.

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY, DETROIT 32

Service in Principal Cities



Trail-Aire Conditioner
Provides Perfect Protection for Perishables in Any Climate
A true air conditioner—supplying heating or cooling as needed. It maintains correct uniform temperature within the Trailer by thermostatic control.
Send for fully illustrated folder with specifications.
"TRAIL-AIRE CONDITIONER"

Fruehauf Trailers

"Engineered Transportation"

REG. U. S. PAT. OFF.

INSIDE NEWS

DECEMBER PREPARED BY NATIONAL CAN CORPORATION, NEW YORK, N. Y. 1945

Meal Preparation Revolutionized by Wartime Development of Canned Meat Combinations

The development of a wide variety of canned meats—in combination with vegetables and gravy—promises a brighter future for the family pantry . . . as well as for the food processor.

Brought to the fore when the Quartermaster Corps increased the variety of food for men in combat, these new "combination meals" have become very popular.

At first, the Army had only ten canned meat items to serve soldiers stationed in forward combat areas. Ten different kinds of canned meat may seem to be a wide variety, but when you consider meat the mainstay of the meal, even ten different canned meats lose their appeal when they're served day after day. As a result, new combinations were planned that could be canned and delivered safely to the boys in the fighting lines. Although meat and vegetable combinations were never made before for canning, the project was pushed ahead.

New Combinations Planned

Combinations were made of meat with noodles, with rice, with potatoes and gravy and sauces to give variety to meat meals and well-balanced, nourishing food at the same time.

By V-J Day, 45 different meat items were included in the cans that made up the bulk of our fighting men's food. Quite different from the "corn willy" and "goldfish" of the last war, these new canned meat combinations were made especially to appeal to the tastes of American boys used to good American food.

Mouth-watering Courses

Ham and candied sweet potatoes, beef and gravy, fat little sau ages all set to eat were also packed neatly in cans. These canned "main courses" made menus more interesting for the men on the fighting fronts where canned meats were the only ones served.

Savory ham in raisin sauce became a universal favorite. Chopped ham and eggs, pork and rice, ham and eggs with diced potatoes, pork and applesauce were some of the other combinations—whole meals sealed neatly and safely in tin and steel containers.

A meal including one of these combinations was really something to write home about. Even at home, it would have been something to get excited about!

Canned bacon which could be eaten hot or cold was also very popular. And it was a treat to find bacon safe and delicious, all packed in cans, so far from home.

Making up these gourmet delights was possible only because cans were such perfect protective containers. Just as cans brought good food to the fighting fronts, they are going to bring better and a wider variety of foods to civilians than ever before. These new combinations and conveniences in menu planning will be supported by good nutrition for which canned foods are already famous.

New Markets

So far, indications are that some of these new meat combinations can be expected in cans on grocers' shelves, though it isn't known just how many or which ones.

The peacetime civilian markets for these canned foods should be great. Appeals for "quickie" meals when unexpected guests drop in, or even when the housewife herself hasn't too much time, can easily sell the consumer public.

Manufacturing cans for food, chemical, drug, cosmetic, oil and paint products before the war, National Can Corporation turned its full production and research facilities during the war to supplying the armed services with protective containers. Today, you can draw on this broad experience to solve your packaging problems. A National Can representative will be glad to offer his long packaging experience in discussing your packaging needs. Write or phone the nearest National Can branch today. Sales offices and plants are conveniently located. 1141

Apple Syrup

Cull apples have been a drug on the market whenever there was a large apple crop. Within recent years, food technologists have been developing by-products from these waste apples. One procedure was developed for making an apple syrup. This has found favor in industrial applications as a moisture-retaining agent because of its high levulose content. It is also being used as a tobacco humectant.

As an edible food, it is objectionable because of its slightly bitter aftertaste. The removal of lead and arsenic spray residue deposits was difficult under this initial process. However, continued work by this food laboratory found a solution to the objectionable aftertaste and spray residue problems. The new procedure uses the absorption powers of ion exchangers. 1142

Oyster Beds Resist Explosives

Louisiana industries were desirous of determining whether there would be any damage to oysters by normal oil exploration charges. Extensive dynamite experiments were made that will have far-reaching effect on the oyster and oil industry. The size of the charge ranged far in excess of those usually permitted. The experiments revealed that the oysters and oyster beds were not damaged.

In the tests, oysters were taken from the reefs before and after the charges were fired and given lengthy observation. Previously, research men conducted experiments to determine the effects of dynamite charges on fish and shrimp in the Gulf area. 1143

Marmalade Vitamins

Average commercial marmalades of unknown history, obtained from retail stores, range from 4.4 to 9.1 mg. of ascorbic acid for 100 g. Specially prepared marmalade, suggested as a vitamin supplement material, may show an average after cooking of 28.6 mg. ascorbic acid per 100 g. This special marmalade has a fruit to sugar ratio of 1.2 to 1. The trick in vitamin retention lies in the processing method. 1144

Cured Bacon Losses

Bacon that has been cured to withstand overseas storage conditions must be soaked before frying to make it palatable. But this overseas bacon, soaked before frying, loses all but 20 percent of the original thiamine and 30 percent of the nicotinic acid originally present, while 78 percent of the riboflavin remains. Losses in frying without soaking are much less. 1145

Some Spices Preserve

The old idea of spices as preservatives boils down to the proven statement that some are, and some are not.

Cinnamon and cloves, in water infusion, will prevent the growth of yeasts and may have an actual germicidal action. Pepper, either white or black, seems to encourage some yeasts. Several other spices are slightly discouraging to the yeasts but not effective preservatives. So if you are putting your faith in spice, make it cinnamon. 1146

Honey Inverters

Enzymes in honey may have technological interest, as well as providing a means to distinguish between genuine and artificial, or heated and unheated honeys.

Honey invertase, about which very little is known, differs markedly from yeast invertase, in some of its properties. However, the darker the honey, the greater its invertive activity toward sucrose. 1147

NATIONAL CAN

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Of Interest to Bakers

Army Spread, the butter-and-cheese-curd "preserved butter" that is made for the tropics, is found not to be suitable for home cooking but can be utilized efficiently by commercial bakers for cookies, sweet yeast-raised goods and Danish pastry. 1148

Crabs

Sea water is utilized for cooking and for washing king crabs on a cannery ship, according to an interview with the captain and the technologist of the vessel. The product needs no added salt and no buffer solution in the can.

A complement of about 400 persons, including the fishermen, is required on board the factory ship, in order to produce a pack of 400 cases each containing 96 half-pound flat tins of fancy or Grade A crabmeat. The less desirable grades are not packed. 1149

Meat Tenderness Studied

Tenderness is one of the important components of palatability in meat. A theory widely held for some time is that the fatter the animal the tenderer its meat will be. A reliable, easily applied guide to tenderness would be of great value to all who handle meat. Because of the many conflicting research reports, a series of experiments were planned primarily to observe the relationship between fatness and tenderness. Lambs were used in these tests. Extensive data and accompanying conclusions have been published in bulletin form. 1150

Weed Control

Growth-promoting chemicals may be important as weed killers. The weeds literally grow themselves to death. The action is selective in certain cases.

In a recent experiment, bindweed in an orchard was destroyed within 10 days, the below-ground parts being affected to a depth of 14 inches, while the apple root-stocks appeared unaffected. In another test, application during July, August and September caused the self-destruction of dandelion, narrow-leaved plantain lamb's quarters, pigweed, and other weeds, and poison ivy was so weakened that the plants were dead by spring. Grasses, in general, are not affected. White clover, dandelion, narrow-leaved plantain and round-leaved mallow were removed without injury to a Kentucky bluegrass lawn. Cereal and turf seeds germinated normally in soil of the treated areas, 5 weeks after treatment.

The chemical used is 2-4-D (2,4,dichlorophenoxyacetic acid), already used for setting tomatoes in greenhouses and for promoting the rooting of cuttings. The extent of the weed-killing property is still under investigation and limitations on its use must be explored before it can be regarded as other than experimental, but it is promising. 1151

Technical Topics

EDIBLE OIL FOR PERFUMES—Filbert oil, one of the best edible oils, is said to have the property of absorbing and retaining odors in perfumes. 1152

PROCESS TIME—Thermal processing time or temperature can not be reduced for canned meat because of the presence of any or all of the common curing agents, NaC_l, $NaNO_3$, $NaNO_2$ and sugar, in the proportions permissible in meat products. 1153

INSECTICIDE SOLVENTS—Studies of the most acceptable solvents for DDT indicate that several ketones, such as acetophenone, cyclohexanone, methyl isobutyl ketone, isophorone, and mesityl oxide, have high solvent power for DDT. The aromatic hydrocarbons (benzene, xylene, etc.), the chlorinated aliphatics (methylene chloride, trichlorethylene, etc.), and the chlorinated aromatics (chlorobenzene, orthodichlorbenzene, etc.) are very good solvents. Solubility of DDT in certain ethers such as dioxane and anisole is also very high. Several esters such as ethyl benzoate and tributyl phosphate are only moderately good solvents. The aliphatic petroleum fractions are comparatively poor solvents for DDT, but will probably be widely used because of their ready availability. 1154

NEW BORAX-BASE FLUX—In a search for substitutes for fluorides, research workers developed borax-base fluxes for aluminum, which have proved extremely satisfactory. A typical composition is: Borax, 50 parts; potassium chloride, 25 parts; sodium chloride, 25 parts; titanium dioxide, 2.5 parts; sodium bisulphite, 11.3 parts. 1155

NEW ABRASIVE—Cerium oxide is reported to be far superior to any material heretofore used as a fine abrasive for polishing optical glass and metals. Its use was disclosed among the other secrets which the war got out of Germany. It is made from the crude hydroxide by treating with nitric acid, trisodium phosphate, and oxalic acid, and igniting. 1156

ZINC VANADATE—The efficacy of zinc vanadate as a catalyst in the synthesis of acetone from acetylene and water has been reported. The presence of carbon monoxide, carbon dioxide, methane, hydrogen, and a mixture of carbon monoxide and hydrogen, it is said, does not adversely affect the process. 1157

SYNTHETIC THYMOL SOURCE—Australian eucalyptus oils are being heralded as the source of synthetic thymol and menthol. The oil of *E. dives* and *E. numerosa* contains 45 percent to 50 percent of l-piperitone; the oil of *E. citriodora* contains 70 percent to 85 percent of citronella. 1158

NEW METAL PIGMENT—A patent has been issued for a finely flaked (325 mesh) electro-deposited nickel, making it the latest addition to the class of metallic pigments. 1159

BETTER LACQUER—The addition to plasticized shellac varnish of 7.5 percent to 10 percent (on the weight of the shellac) of ethylcellulose results in a lacquer which has properties equal to, if not better than, those of a standard nitrocellulose-dammar lacquer. 1160

PAPAIN FOR WOOL—Papain, used to treat wool, shows some promise of making "non-tickle" woolen clothing. 1161

EXPLODING FRUIT PEELS OFF—It is reported that a novel method for exploding the peels from vegetables and fruits has been patented recently. 1162

PECTINS SHOW POSSIBILITIES—Recent reports indicate that the metallic salts in pectin may have valuable industrial applications, such as in the cosmetic industry. 1163

GLYCERINE CRYSTALS—Method of preparing glycerine crystals to super-cool liquids has been announced. 1164

GLASS-TO-STEEL—Glass-to-steel fusing, to make a permanent airtight seal for metal electron tubes, is now possible through a method developed by engineers. 1165

CHEMICAL COMBINATIONS AND THE SKIN—Recent research is reported to show that living skin can be changed chemically under the influence of externally applied substances. 1166

AMINO ACID INFLUENCE ON PROTEINS—A recent study has revealed that amino acids are essential to increasing the nutritive value of foods. 1167

Every effort will be made to furnish additional information on these articles. Where such information is not obtainable, we will refer inquiries to the original source of the article. Write to National Can Corporation, 110 East 42nd Street, New York City. Please mention the number at end of article—also name of the magazine you saw it in.

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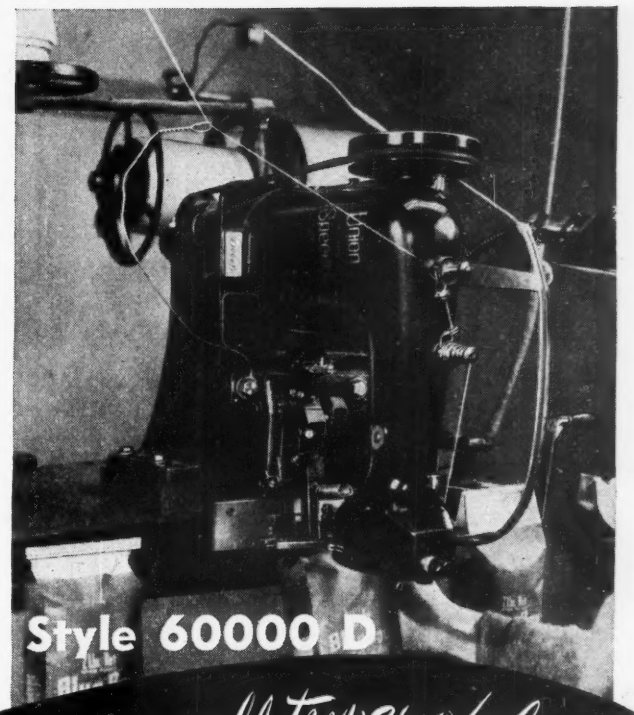
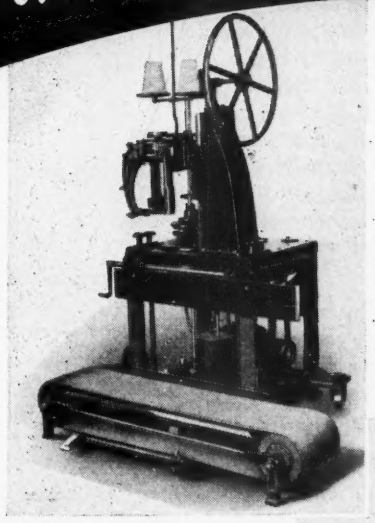
Packaging in Small Paper Bags

The *right* type of closure adds merchandising value to the small paper bag. That means a Union Special Dubl-Tape Closure. Install a UNION SPECIAL STYLE 60000 D sewing head in your packaging department and watch results! The method is fast and economical; the machine is easy to operate, adjustable to a wide range of bag sizes; compared to other bag closing equipment, the investment is modest.

The DUBL-TAPE CLOSURE, sewed with strong stitches through the double safety of two strong paper tapes, makes the small paper bag a neat, sturdy, good-looking package. It is inexpensive to produce and can be used on filled bags up to 25 lbs. size.



newer, better methods of closing all types of bags



Style 21800 C is for closing cotton, burlap and paper bags. Designed for mounting Class 14500 medium duty or 80600 heavy duty sewing heads. Independent or synchronized conveyor belt travel. Sewing head and conveyor adjustable vertically.

Closing Larger Paper and Fabric Bags

Machines for closing *all* types of fabric or paper bags are in the Union Special line, including sewing heads, columns, tables, conveyors and accessories. Combination installed to meet any requirement.

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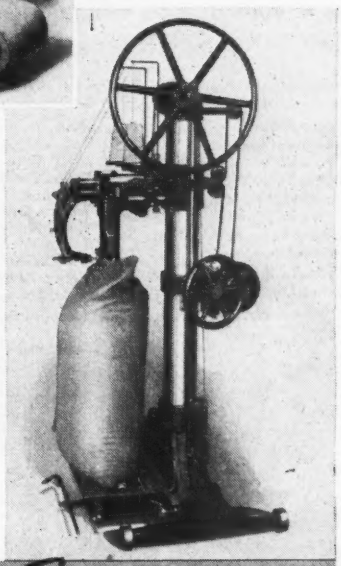
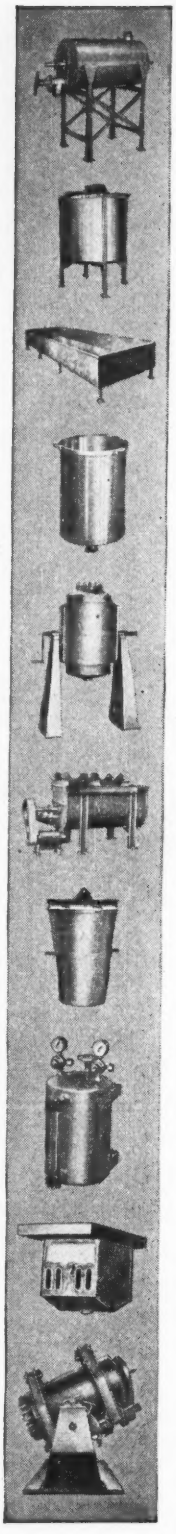


Style 20100 D is for general utility duty. Has Class 14500 sewing head and floating bag carrier which returns automatically to its loading position when closed bag is removed. Carrier and sewing head both adjustable vertically. Portability makes unit popular.

Union Special *Bag Closing Machines*



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Every manufacturer has a reconversion problem and each problem is different. That's why these over-burdened manufacturers turn to KOVEN for assistance. They know of KOVEN'S 64 year reputation for outstanding work in designing and manufacturing individualized food equipment. This equipment performs its job more efficiently and more economically because it is made to specific requirements.

If you are in need of the right equipment to help you through reconversion, a KOVEN representative will be glad to assist you. Call or write to KOVEN for a consultation which will not obligate you in any way.

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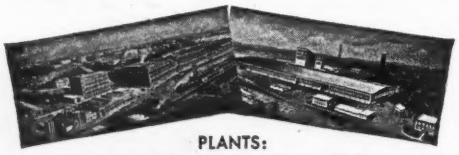

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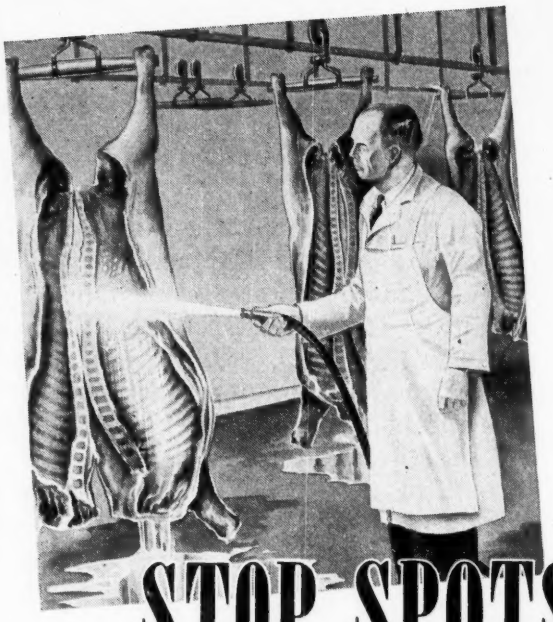

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and discoloration by chlorinating WASH WATER

Certain types of microorganisms in unsterilized wash water produce spots and blotches on the surfaces of meat and other food products.

Even if such microorganisms are not dangerous to health, the discoloration they cause is highly objectionable. Off-flavors also may result.

Microorganisms of every type can be eliminated from wash water by controlled chlorination, using Wallace & Tiernan equipment.

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Designing shipping containers to fit a freight car and NOT to hold a given amount of goods was a critical problem which was solved militarily.

There is NO reason why industries cannot adopt this procedure when the contents "Fit the Container" — which Fits the Pallet — which Fits the Boxcar.

Prior to the Palletized method, it took 14 men a half a day to break material out of stowage and load a car, handling each container separately. Now one person on a fork truck can load the same car in less than 2 hours.

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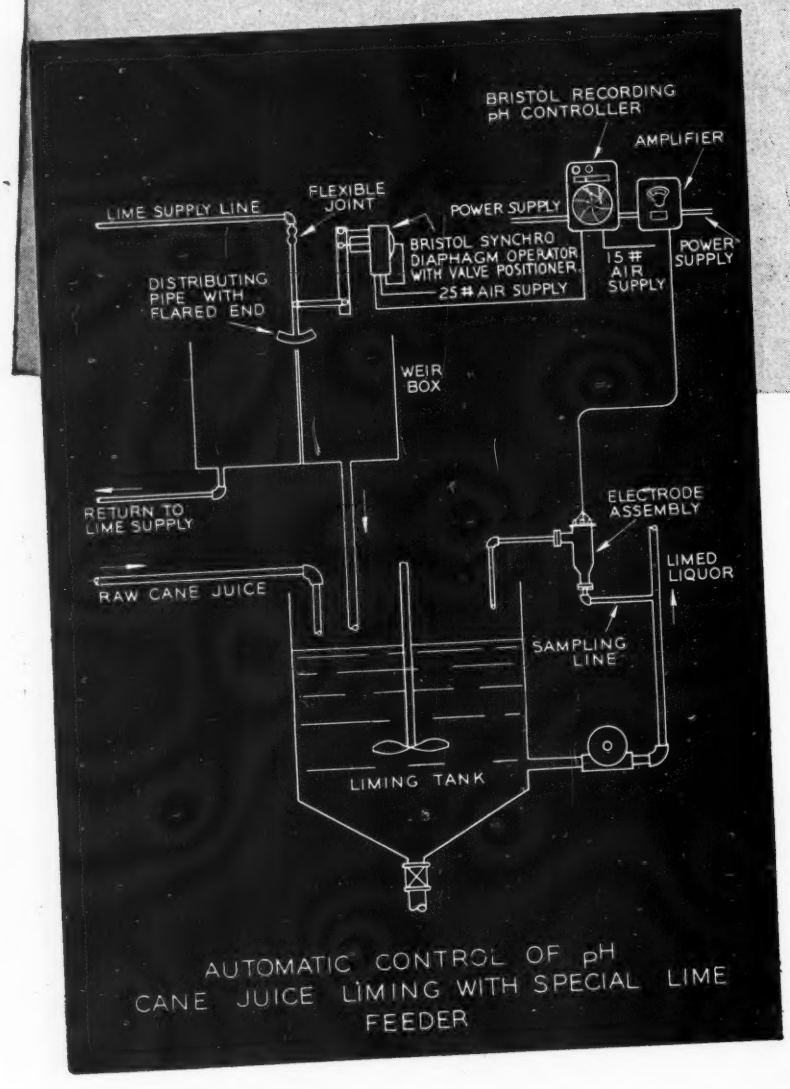


AUTOMATIC CONTROL OF pH CANE JUICE LIMING WITH SPECIAL LIME FEEDER

AUTOMATIC CONTROL OF LIMING

Bristol pH Controller automatically adjusts the flow of lime from the lime supply whenever the pH value in the tank changes. At the same time, it keeps a permanent record on a 12-inch circular chart. The control mechanism operates on the Bristol "Free-Vane" principle which eliminates any retarding action upon the recording mechanism.

Results in the sugar industry suggest how to "sweeten up" production and quality in <u>other</u> food industries

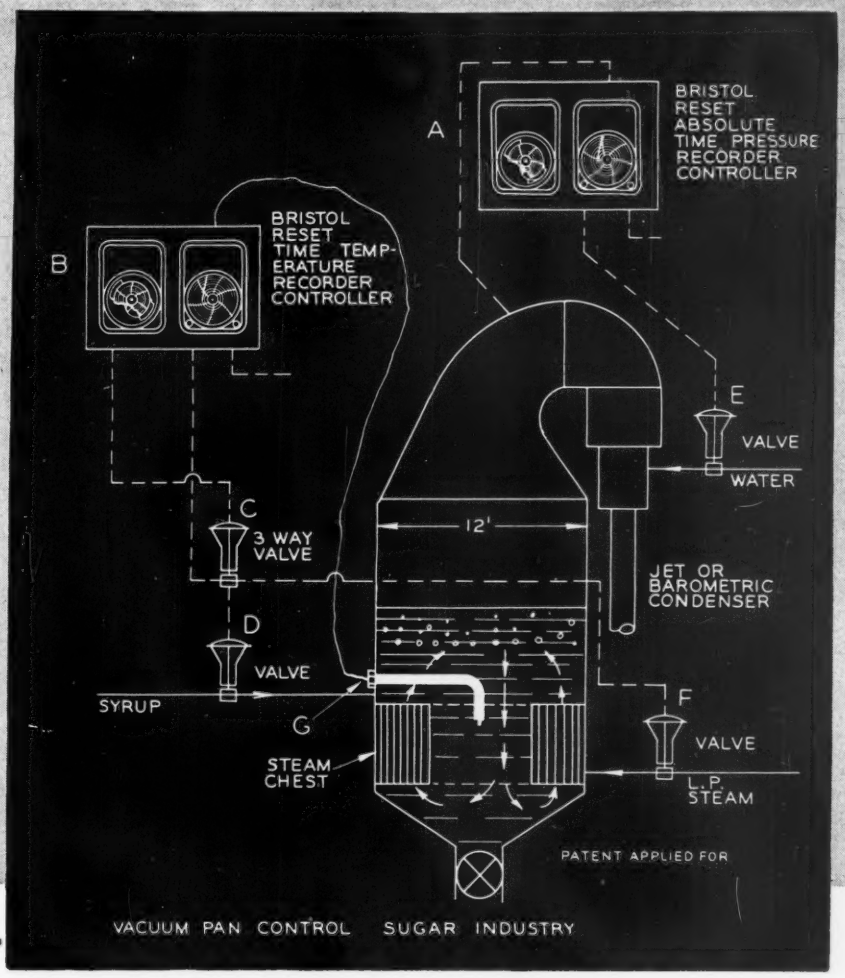
From raw cane to package, sugar is processed under the never-relaxing control of instruments — in many cases, Bristol instruments. The applications noted in the two diagrams demonstrate how Bristol Controllers save time and money while guarding quality.

Left, a Bristol pH Controller continuously reports on the pH in the liming tank and automatically feeds to the tank exactly the right amount of lime to maintain the proper pH value. Once the

AUTOMATIC CONTROLS FOR VACUUM PAN

Bristol's Reset Absolute Time-Pressure Recording Controller operates a valve on the water line to the condenser to keep pressure in the vacuum pan at an absolute constant.

Bristol's Reset Time-Temperature Recording Controller holds the temperature in the pan at the proper level for the proper length of time, then raises it, automatically.



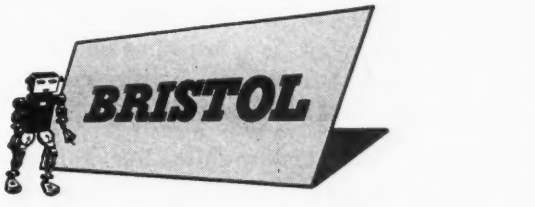
Patent applied for

instrument has been set at the value known to produce the desired clarification, no further attention is needed. The instrument competently takes care of a critical value which formerly was handled by means of periodic sampling — at best an uncertain method from viewpoint of continuous uniformity.

Above, Bristol Instruments make sure that the temperature and pressure of the vacuum pan are always exactly right to form sugar crystals of proper and uniform size, avoiding the so-called "false grain" that requires going through the entire process a second time. Thus, the automatic control provides a product of desired quality and saves loss of operator's time, machine capacity and steam.

Both these systems are quite simple, yet they cover more factors than systems previously used.

Bristol Instruments are used in many other processes common to the sugar industry and undoubtedly yours. For further information specific to your operations, please write us, mentioning the types of processes you operate. Address THE BRISTOL COMPANY, 115 Bristol Road, Waterbury 91, Conn. (The Bristol Co. of Canada, Ltd., Toronto, Ont. Bristol's Instrument Co., Ltd., London, N.W. 10, England).



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So visit soon, your near-by Trailmobile Branch, to see a *great* new van. You will quickly discover countless new ways that Trailmobile will cut your maintenance and operating costs.

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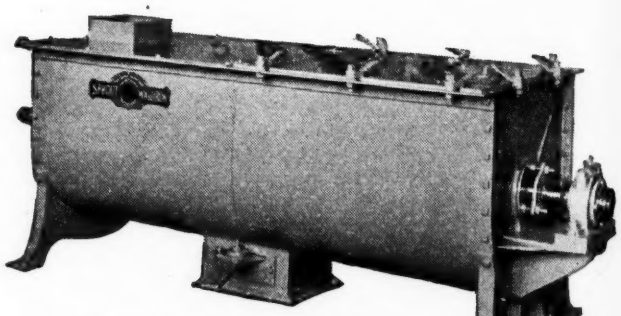

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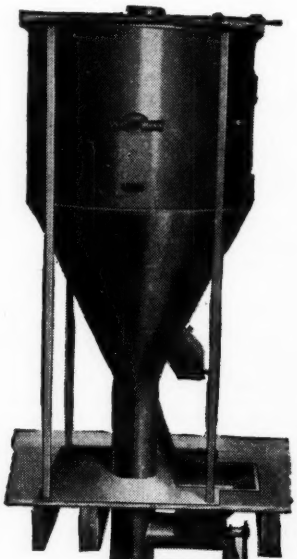

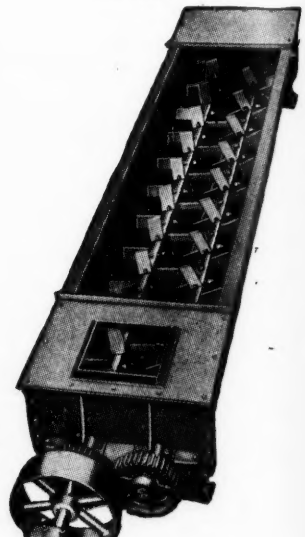

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WANTED: EXPERIENCED fieldman for year around position with a reliable western pea canner. Must be capable of handling contracting, grower problems, planning and directing growing and harvest operations. Excellent opportunity in a growing concern. P-730, Food Industries, 68 Post Street, San Francisco 4, Cal.

FOOD CHEMIST: Raw material standards, product standards, and analytical work. Young chemist who has ambition to couple chemistry experience with administrative opportunity. Candy bar and general line house located in the Middle West. P-751, Food Industries, 520 N. Michigan Ave., Chicago 11, Ill.

CHEMIST WANTED: by a large eastern meat packer with training and experience in food technology and analysis. Ability to carry on research and product development work. Excellent opportunity. State age, experience, training and salary requirements. P-752, Food Industries, 330 West 42nd St., New York 18, N. Y.

(Additional Employment Advertising on Page 276)

WANTED

FOOD RESEARCH CHEMIST

Expert in formulation, stabilization and production of dry prepared muffin, pancake, waffle, gingerbread, pie crust and cake mixes for the home. Must know baking technology and control procedures. B.S. or better with biochemistry background and ability to do original work on dry and frozen dough mixes. Excellent opportunity and future for practical food specialist under 40 with large milling concern in Northwest. Submit details of age, health, ancestry, education and experience along with recent snapshot in strict confidence.

P 712 Food Industries
520 North Michigan Ave., Chicago 11, Ill.

POSITIONS VACANT

LARGE MIDWEST manufacturer, enlarging and moving into modern plant, 150,000 square feet floor area, desires services of superintendent experienced in general line confections for chain store and jobber distribution. Must be capable of assisting in streamlining plant layout and installation, selection of equipment, and supervision of production and labor. Must be able to create new items, design packages. Departments contemplated: starch casting, enrobing, hard candy, caramels, toffee, fudge, panning, moulding chocolate, chocolate refining, 5c bars. Reply in detail, giving past experience, former employers, salary expected. Replies will be treated in strict confidence. P-755, Food Industries, 520 N. Michigan Ave., Chicago 11, Ill.

FOREMAN AND experienced candymaker, hard candy, toffee, caramels, fudge; starch casting, enrobing, pan department. Plant located central west. Reply with complete information giving history of previous employment, experience, age, and salary desired. P-756, Food Industries, 520 N. Michigan Ave., Chicago 11, Ill.

FOOD TECHNOLOGIST: excellent opportunity for young man to supervise product control and development laboratory of successful western New York manufacturer of food products for soda fountains and bakeries. State personal qualifications, education and experience. Starting salary $3000 to $4000 per year depending upon qualifications. P-753, Food Industries, 330 West 42nd St., New York 18, N. Y.

SUPERINTENDENT AND Production Manager: Capable full charge large fruit packing plant. Permanent position, excellent salary opportunities aggressive, experienced man. State in detail previous employers, experience, education and training, references, other qualifications. P-754, Food Industries, 330 W. 42nd St., New York 18, N. Y.

POSITIONS WANTED

FISH FOOD Specialist. Good organizer fisheries. Cure salt herring, cod fish, smoked herring quick method. Pack fish shredded. Fish cake fish chowder. PW-732, Food Industries, 330 W. 42nd St., New York 18, N. Y.

FOOD TECHNOLOGIST with twenty-five years' wide experience in the food industry, in direction, research, process development, quality control and factory problems including beverages, confections, baked cereal products and canning. Have a good record. Desire position as technical director with company manufacturing diversified line of food products. PW-734, Food Industries, 330 W. 42nd St., New York 18, N. Y.

SUPERINTENDENT OR Chief chemist of food plant. Extensive experience in production, development and technical supervision of food products. Knowledge of enzymes and bacteriology. Chemist, M.S. Only permanent position considered. PW-735, Food Industries, 520 N. Michigan Ave., Chicago 11, Ill.

SERVING 37,000,000 Meals was important part of responsibilities as a former major in the Army Air Forces. Entailed experience in supervision planning and writing menus, training cooks, bakers, meat cutters, food preparation, cost records, nutritional analysis and food buying. This coupled with 2 years' advertising copywriting, layout and production work and 2 more years of successful selling experience plus a B.S. degree in Advertising will make this young man a valuable executive in a food company. Has ability to direct and train people. Age 30, married. Interested particularly in sales promotion of frozen or dehydrated foods. PW-757, 520 N. Michigan Ave., Chicago 11, Ill.

PRODUCTION MANAGER and plant superintendent thoroughly experienced and with extensive knowledge technical and practical phases of plant operation various manufacturing fields such as frozen foods, chocolate syrups, dessert powders and fresh vegetable processing and packaging desire permanent connection similar capacity. PW-737, Food Industries, 330 W. 42nd St., New York 18, N. Y.

SEARCHLIGHT SECTION

PRODUCTION ENGINEER AVAILABLE

Graduate Chemical Engineer. Past fifteen years executive and production experience beverage industry. Well qualified for management or executive responsibilities in beverage or allied lines.

PW-745, Food Industries,
68 Post Street, San Francisco 4, California

FOOD TECHNOLOGIST with M.S. and 10 years' diversified control, analytical, research, development and pilot plant experiences covering most foods. Age 35, married. Extensive frozen foods experiences in processing, package development, quality control, distribution and merchandising. Desires permanent connection with frozen food processor, packaging material manufacturer or will consider advancement in production or technical research in food plant. Please reply in detail. PW-746, Food Industries,
520 N. Michigan Ave., Chicago 11, Illinois

POSITIONS WANTED

(Continued from page 275)

CHEMIST: WITH production and technical experience in various foods, confections, chocolate products, desires responsible position in New York City area. PW-758, Food Industries, 330 W. 42nd St., New York 18, N. Y.

IF INTERESTED in production of malt syrup, hydrolytic starch syrup and dextrose sugar from the starch of flour, wheat or corn, Address: Experienced Refiner, PW-759, Food Industries, 330 W. 42nd St., New York 18, N. Y.

WISH TO make change. Graduate mechanical engineer. Can Maker. Capable of installing, operating or managing any size Can Making Plant. Extensive experience in all phases of Can Making and closing operations. Particularly interested in new or foreign operations. Compensation according to duties but state location and salary range in first letter. PW-760, Food Industries, 330 W. 42nd St., New York 18, N. Y.

BAKING PRODUCTION: Manager desires position with progressive cake bakery. Capable of handling every department from production to sales. 17 years' experience with nationally known firms in technical and production departments. Recognized authority in field. Can reduce costs and increase business through progressive methods. PW-761, Food Industries, 330 W. 42nd St., New York 18, N. Y.

INDUSTRIAL SANITARIAN: background in industrial sanitation, hygiene, and safety—canning plant experience, available soon. PW-763, 520 N. Michigan Ave., Chicago 11, Ill.

MAN QUALIFIED to take complete charge of organizing or operating process cheese plant, develop formulas, specialty packaging. Long experience; nationally recognized in process cheese field. PW-764, Food Industries, 520 N. Michigan Ave., Chicago 11, Ill.

PLANT MANAGEMENT or development. Graduate chemist, civil service rating: industrial engineer, extensive experience in development and production of bakery and grocers cereal specialties. 4 years' consulting experience with Canadian and American Governments on war work. PW-765, Food Industries, 330 W. 42nd St., New York 18, N. Y.

BUSINESS OPPORTUNITIES

CAKE BAKERY: want to buy medium-size wholesale cake bakery capable of growth. BO-762, Food Industries, 330 W. 42nd St., New York 18, N. Y.

IF YOU operate a business from 1 to 300 employees and are looking for someone to take some of the load off your shoulders then read on. I have a chem. eng. degree. I have worked largely as mech. and indus. eng. and some in supervisory capacity. I can bring large variety of experience into food industries. I can invest small capital. Why don't you invest in letter. BO-766, 330 W. 42nd St., New York 18, N. Y.

SELLING OPPORTUNITY OFFERED

EQUIPMENT SALESMEN Wanted: A nationally known manufacturer of bakery machinery and equipment is looking for high-grade calibre salesmen having successful sales experience selling bakery equipment. Consideration will be given to men of good character who are experienced in bakery production and have an aptitude for selling bakery machinery and equipment. Our salesmen know of this advertisement. All replies will be treated confidentially. SW-767, Food Industries, 330 W. 42nd St., New York 18, N. Y.

SELLING OPPORTUNITY WANTED

SALES REPRESENTATION in New England—efficient native New Englander well experienced distribution and sale dried milk, malt and eggs; supplies to bakers, confectioners, and ice cream mfrs. brokerage, commission or salary considered, inquiries invited without further obligation. SA-768, Food Industries, 330 W. 42nd St., New York 18, N. Y.

PACKERS AGENT
for Frozen Foods

We cover a fast growing market in Northeastern Ohio and can help you establish your line for post-war business . . . Have well established contacts throughout this territory . . . Can handle a full line of frozen foods . . . Contact us for details.

MARTIN LAWRENCE CO.

2000 West 14th Street
Cleveland 13, Ohio

WANTED
sole representation

in Holland, for American factories or exporters of any **foodstuffs,** by Dutch firm, well-known and connected with all wholesale dealers in Holland.

Good experience and knowledge of the trade, can guarantee best results and maximum turnover.

Handelsonderneming Alex Groot
Aelbrechtskolk 39—Rotterdam, Holland

AGENCY

Importer with cold storage warehouse, and office, located at waterfront near Rotterdam (Holland) wants agency or representation, preferably FOODSTUFFS. Capital and first class references available. Write to

D. Hatenboer, Hoofdstraat 41-59, Schiedam (Holland)

MORE PROFITS

FOR YOUR COMPANY

LESS WORRY and EXPENSE

FOR YOU

TO sell your business for cash to a reputable and experienced operating concern with substantial capital may be the best thing for both the company and you.

WE are principals (not brokers) with a record of successful operating experience. Present company personnel retained wherever possible.

• ***ALL discussions and negotiations strictly confidential***

Box 1219 — 1474 Bway, N. Y.

FRANCHISE GRANT
POSTWAR

Manufacturing: Sales and Distribution rights: If interested write

MRS. BENTZEN'S
DANISH COOKIE CO., INC.
2700 Geary Blvd., San Francisco, Calif.

Modern Canning Plant FOR SALE

Located in the Rich growing section of Southern Pennsylvania. Plant now engaged in Canning Peas and Sweet Corn. Sufficient space to start more items if so desired. Immediate possession can be given.

BO-676 Food Industries
330 West 42nd St., New York 18, N. Y.

Responsible Firm Wants to Buy

EAST COAST

CANNING FACTORY

Preferably going, modern plant with at least 50,000 sq. ft. floor space, complete with materials and help; land for expansion, siding, good location.

Address W748, Food Industries, 330 West 42nd St., New York 18, N. Y.

SPRAY PLANT WANTED IMMEDIATELY

LARGE DAIRY COMPANY REQUIRES ADDITIONAL EQUIPMENT URGENTLY. WE ARE LOOKING FOR A MILK SPRAY DRYING PLANT BY REPUTABLE MANUFACTURER. CAPACITY 6,000 TO 8,000 POUNDS OF MILK PER HOUR. IN GOOD WORKING CONDITION, WHICH CAN BE TRANSPORTED AND RE-INSTALLED IN OUR OWN LOCATION NOT LATER THAN FEBRUARY 28TH.

Full details and price to

W 747, Food Industries
330 West 42nd St., New York 18, N. Y.

As for the past 30 years

"CONSOLIDATED"

Sends Season's Greetings and Best Wishes
For Peace and Prosperity in the Days Ahead

7—Copper, Glass Lined, Kettles and Vacuum Pans, up to 550 gal. capacity.
6—Pony Mixers, 8 to 80 gal. capacity.
6—Dry Powder Mixers, various sizes to 2000 lbs.
1—Horizontal Steam jacketed Mixer 1100 gal.
5—Double and Single arm Mixers, jacketed and unjacketed, up to 500 gal. cap.
2—World, 1—Ermold semi-auto. Labeling Machines.
1—No. 5 Sweetland Filter with 20 Copper leaves.
6—Filter Presses P & F; recessed; to 42" square.
1—350 gal. Aluminum jack. agit. Kettle or Still.
2—350 gal. Copper Steam Jack. Kettles.
6—DeLaval and Sharples Super Centrifuges.
2—Mechanical 4x8' Lard Rolls, m.d.
2—Schultz-O'Neil Pulverizers.
1—Copper Tank 1650 gal.
1—Pneumatic Scale straight line Bottle Cleaner.
2—Burt & Knapp automatic Labelers.
Roller and Belt Conveyors all sizes.
1—Buffalovac 32 x 72 Atmos. Double Drum Dryer, M. D.
6—Dopp cast iron, steam jacketed Kettles, up to 1000 gallons capacity some with agitators.
2—200 gallon Pfaudler Glass Lined Jacketed KETTLES.
1—5" dia. All Copper Steam Jack. Vacuum Pan.
1—World Rotary Auto. Labeler, M.D.
4—Jones & Anderson Cartoning Machines.
1—Robinson 18" Attrition Mill; 2 Bauer 22", 15 H.P. motors.
5—Horizontal Copper Tanks, 275 gal.; 7—vertical 175 gal.
2—150 gal. Aluminum Tanks, cone bottom.
1—Stokes DDS—23 punch Rotary Tablet Machine; 1—Stokes O, sgl. Punch ¾".
2—Horizontal glass lined Tanks, truck type, 900 and 1250 gallons capacity.
1—Portable Revolvator, 1000#, 11' overall height, m.d.
1—Horizontal 250# Dry Powder Mixer.
1—McClellan dry powder Tumbling Mixer.
1—J. H. Day size 10 jacketed Imperial Mixer, 30 gal.
1—Pneumatic Scale Fully Automatic Packaging Unit with liner complete.
1—Devine Vacuum Shelf Dryer unit, 8-40" x 42" Shelves complete.
6-28" x 60" Atmospheric Double Drum Dryers complete.
1—36x72" Buffalo Atmospheric Double Drum Dryer.
5—W&P Mixers, 150 gal. cap. Jack. Double Sigma Blades.

BUY WITH CONFIDENCE

THE KEY TO SAVING TIME AND MONEY

FOR OVER A QUARTER CENTURY — SYMBOL OF CONFIDENCE

CONSOLIDATED PRODUCTS COMPANY, INC.

SELL US YOUR IDLE MACHINES

OFFICE: 13-17 Park Row, New York 7, N. Y. SHOPS: 335 Doremus Ave., Newark N. J.

Send for "CONSOLIDATED NEWS" listing Complete Stock

FOR SALE—Complete flour milling equipment, eleven-hundred dollars cash. Includes flour dressers, scalpers, air purifiers, polishers and separators, corrugated roller mills, oat clipper, corn sheller, elevators, 160 feet of steel shaft lines with great variety of steel pulleys, and 150 feet of worm conveyors. Equipment obsolete but in good condition. No priorities needed. Original cost $20,000, $1,250 net to owner. This style machinery still being used in large mills today. Write to P. O. Box 713, Fredericksburg, Texas.

IN THE WEST

★

Karl Kiefer 18-spout Rotary Syphon Filler.
2—Karl Kiefer 6-spout Gravity Filler.
Bruno Bulk Weight Filler for liquid.
Hoepner Powder Filler; 1 spout.
Mechanical Eng. Chill or drying roll, 4' dia-9' long.
Karl Kiefer 6-spout Tray Type Filler.
Copper Kettles, 10 to 250 gals., in stock.
10—Copper Tanks, 100 to 600 gal. capacity.
Urshell (FMC) Continuous Peeler, motorized
2—Stokes # 412-C High-Vacuum Pumps.
2—Stokes Surface Condensers, 67 sq. ft.
A. T. & F. 36" Centr. Extractor, bottom disch.
Horizontal Retort, 36" dia. 11' long, 2 doors.
Wells Horizontal Retort 56" dia. 21' long with quick opening door, center wheel closing.
A. B. Cooker & Cooler for #2-#2½ cans.

Dependability with Economy

MACHINERY AND EQUIPMENT CO.

705 BRANNAN ST. SAN FRANCISCO 3, CALIF.

WANTED

Automatic top and bottom sealer with filler, also wax wapper with electric eye. Mochines must be adaptable to carton 1-5/8x2-3/4x4-1/4 and have speed of 50 or more per minute.

W 750, Food Industries
520 N. Michigan Ave., Chicago 11, Ill.

Wanted to Buy . . .

Mayonnaise and salad dressing plant or equipment. Write full details. George Acred, P. O. Box 191, Memphis, Tenn.

Aluminum Kettles — Single Wall. Available in sizes from 3 to 40 gallons, with or without draw-off or stands. Write us your requirements.

Harper Oven & Equipment Co.
519 Wyandotte Street
Kansas City 6, Missouri

---

75 New Bronze Allis-Chalmers Pumps

Priced at Fraction of Original Cost. Immediate Delivery.
NO PRIORITY NEEDED.

All bronze, ball bearing, centrifugal pump units consisting of two pumps on one shaft; setup for either direct drive or pulley drive. These are marine type pumps for salt and fresh water, but can be used for chemicals, foods, distilleries, etc. Without motors. Sizes: 3", 3½", 4", 4½" and 5". Unit weighs approximately 350 pounds. G.P.M. 350 to 600. FT. HD. 60 to 90 R.P.M. 3,300. Photo and specs. sent on request.

AMERICAN SALES COMPANY
1562 Harrison Ave. Cincinnati 14, Ohio

WILL PURCHASE

SPRAY DRY EQUIPMENT. Bowen, Instant-On or similar equipment. Nozzle type equipment unsuitable. Will consider RENTAL if in New York State area.

W 722, Food Industries
330 West 42nd St., New York 18, N. Y.

Miller Cellophane Wrapper and sheeter (used)—with motor—$550.00.

F S 710, FOOD INDUSTRIES
330 West 42nd St., New York 18, N. Y.

Due to change in style of package we have to offer FOR SALE: 1 hand operated complete line for top and bottom sealing cartons of approximate size 4⅛ x 2¾ x 6½, capacity approximately 25 per minute, equipped with two ¾ h.p. 220 volt Sterling slow speed motors, together with Edbauer Duplex Disc Feed Weigher, 1#-5# capacity, $1620.00, in good operating condition. Price of carton line without scales $1250.00. GEO. F. MARTIN & CO., P. O. DRAWER 511, WATSONVILLE, CALIF.

SEARCHLIGHT SECTION

SPECIAL OFFERINGS

UNION Rebuilt Machinery Established 1912

UNION Rebuilt Machinery Established 1912

Every Machine Rebuilt and Guaranteed Offered Subject to PRIOR SALE

In Stock . . . Ready for Immediate Delivery . . .

Karl Kiefer Rotary Visco Filler.
Prater Pulverizing Mill.
Elgin 24-spout Rotary Vacuum Filling Machine.
Gayco 8-ft. Air Separator.
Pfaudler 200-gal. Jacketed Glass Lined Vacuum Pan with Pump.
W. & P. Day Cincinnatus and Imperial Type Mixers; Hottman, Paragon, Read, etc. Jacketed and Unjacketed Mixers, Single and Double Arm from 5 gallons to 300 gallons.
Schutz O'Neill, Jay Bee, William, Gruendler, etc., Pulverizers.
Ermold and World Semi-Automatic Labeling Machines.
U. S. Bottlers C-10 and A-6 Acme Fillers.
Copper and Aluminum Steam Jacketed Kettles, with and without Agitators.
Hobart, Read and Century Vertical Cake Mixers, M.D.
Johnson and Oliver Sweetland Filter Presses.
Copper Stills and Vacuum Pans.
Huhn Rotary Continuous Dryers.
Schutz O'Neill, Rotex and Allis-Chalmers Lowhead Sifters.
Package Machinery Co., Johnson all types, Wrapping, Packaging, and Cartooning Equipment****Please submit samples of your items with your inquiries. *WRITE FOR LATEST CIRCULARS*

WE PAY CASH FOR SINGLE MACHINES OR ENTIRE PLANTS!

Union Standard Equipment Company

318 Lafayette Street — New York 12, New York

FOR SALE

1—Jeffrey Swing Hammer Shredder.
5—125 Bbl. Wood Tanks.
3—Rotary Rinsers 60 and 72 spout.
1—J. H. Day Size 2 Triturator.
20—Used and New Filters, All Sizes.
2—Jewell 250 GPH Water Stills.
11—Semi-automatic and automatic Labellers.
Groen Stainless Steel Kettles, 20-80 gallons.
2—Filler Machine Company, 4 spout Piston Fillers with Bronze and Stainless Steel Filling Assemblies.
Copper Jacketed Kettles, 20-125 gallon capacities.
Copper and Stainless Steel Vacuum Pans.
1—Buffalo Pickle Cutter.
1—7'0" diameter Buflovac Stainless Steel Pan.

NEW STAINLESS STEEL TANKS AND JACKETED KETTLES, ALL SIZES AVAILABLE.

NEW Solid Roller and Skate Wheel Conveyor.

Write for Latest Stock List.

PERRY EQUIPMENT & SUPPLY CO.
1515 W. THOMPSON ST., PHILA. 21, PA.

STOCK ITEMS

2100 ft. of Lamson & Matthews 21" to 26" Roller Conveyor.
10 12" Belt Conveyors, 25 to 100'.
2 Stokes Rotary Vac. Dryers, 1'6"x3'6", 2'6"x8'.
1 Feinc 5' x 4' Rotary Continuous Filter.
3 Stainless Steel Tanks, 3000 gal.
6 Oliver 8' x 6' Dewaterers, NEW.
2 Kiefer No. 3 Visco Fillers.
1 Filler Machine Co. 6-spout Filler.
3 Pfaudler 200, 400 gal. Jktd. Agtd, Kettles.
3 5' dia. Copper Evaporators, 500 sq. ft.
5 36", 30", 24", 18" Filter Presses.
2 No. 2 & 10 Sweetland Filters.
7 Centrifugals, 32" to 48", motor driven.
5 Rotary Dryers, from 4' x 20' to 6' x 60'.
1 Copper Shell Rotary Dryer, 6' x 17'.
3 Copper Vacuum Pans, 50, 150, 750 gal.
2 6' x 27' Rotary Steam Tube Dryers.
3 Sharples No. 6 and De Laval No. 600 Centrifuges.
3 200 and 600 gal. Copper Closed Tanks.
1 Buflovak Atmospheric Drum Dryer, 5' x 6'.
20 Agitators for Tanks from 10' to 20' dia.
5 Bucket Elevators, 25' to 40' centers.
20 Copper Jacketed Kettles, 20 to 200 gal.
5* World & National Labelers.
3 Powder Mixers, 100 to 800 lb.

NEW STAINLESS STEEL TANKS up to 500 gal.

PARTIAL LIST ONLY. YOUR INQUIRIES SOLICITED.

BRILL EQUIPMENT COMPANY
225 West 34th Street
New York 1, N. Y.

FOR PROMPT SHIPMENT

4—Sharples #16V Stainless Steel Super Certrifuges with 2 H.P., 3 Ph. 60 Cy. 220/400 V. motors and starters. Less than two years old.

SPECIALS

1—Blaw-Knox Stainless Steel Flaker or Dryer, 6'x5'.
1—J. O. Ross 4 Pass Continuous Conveyor Dryer, 68' long.
1—B & B 200 Ton Hydraulic Press 13" Ram with Hydraulic motor driven pump.
1—Stainless Steel Jack. Kettle, 75 gal., with agitator.
1—Copper Jack. Kettle, 120 gals., with agitator.
1—Burkhard Copper Jacketed Kettle, 175 gal.
3—New Stainless Steel Tanks, 225 and 500 gals.
1—Day 600# Dry Mixer—Motor Drive.
1—Oliver Rotary Filter, 3'x1'.
1—Portable Elev., 1500# Cap. M.D.

Send for our latest lists.

We buy your surplus.

MACHINERY & EQUIPMENT CORPORATION (OF N. Y.)
533 W. Broadway, New York 12, N.Y.
GRamercy 5-6680

FOR SALE

250-gal. S.S. Tank, agit., 45"x37".
300-gal. Nickel Tank, jkt., agit., 54"x30".
100-gal. Pfaudler Tank, jkt., agit., 30"x36".
300-gal. Pfaudler Tank, jkt., 42"x48".
450-gal. Pfaudler Tank, jkt., agit., 54"x48".
1000-gal. Pfaudler Tank, jkt., 66"x66".
20" and 36" Centrifugals, copper baskets.
50 to 450 gal. Homogenizers or Viscolizers.
36" Rogers Copper Vacuum Pan.
42"x84" Glass Lined Vacuum Pan.
42"x72" Stainless Steel Lined Vacuum Pan.
Hottman Mixer, 30"x60"x18".
4½x6 Davidson Bronze Plunger Pump.
1½" Viking Bronze Rotary Pump.
Hobart Cutter or Chopper, 1/3 H.P.
New 1 gal. S.S. Laboratory Autoclaves.

Send Us Your Inquiries

LESTER KEHOE MACHINERY CORP.
1 East 42nd Street, New York 17, N. Y.

3—Vacuum Single-Drum Dryers, 1—3'2" dia., 4'6" long; 2—5'10" dia., 10" long.

1—Steel Flaker, 28" face x 48" dia. Cast Iron Roll.
1—Devine Vacuum Shelf Dryer, 5 Shelves, Condenser.
1—Jacketed Copper Kettle, 3750-gals.
10—Steel Brick-Lined Digesters 6' x 20'.
1—Closed Steel Rubber-Lined Tank, 7½' x 9'.
15—Aluminum Storage Tanks, 250 gals.
7—Permutit Water Softeners, 8' x 20'.
3—Swerson Crystallizers, 24" x 24" x 20' long.
4—Aluminum Electrically-heated, Agitated Kettles, 75-gals.
4—Sweetland Filter Presses, No. 5, No. 10, No. 12.
2—Vallez Rotary Filter Presses, No. 4.
Also—Storage Tanks, Condensers, Pumps, Boilers, etc.

(Send for "GELB NEWS RECORD")

R. GELB & SONS, INC.
Union, N. J. — UNionville 2-4900

FOR SALE

Miller Cellophane Box Wrapper & Sheeter
Model C Cherry-Burrell Bottle Washer with motor driven pump
1 HP Lipman Self-contained Ammonia Refrigerating Unit with A.C. motor
80-qt. Read and Triumph Mixers
Type MC 4" Economy Centrifugal Pump 5" Gould Impeller Pump
16" and 20" Buffalo Food Choppers
Buffalo Food Grinder with 8⅝" plates
600 gal. Copper Kettle with coils for heating
16" Kent Burr Stone Mill belt drive
16" Schutz-O'Neill Style D Limited Pulverizer with dust collector

SAVAGE BROS. CO.
2638-46 Gladys Avenue — Chicago

FOR SALE

3—Oliver Filters: 5x4 and 6x4'.
1—World triple turret Labeler.
2—4x6' Atmospheric Drum Dryers.
5—Anderson Vegetable Dicers. Model 2.
2—26-40" Tolhurst copper basket Centrifugals.
4—Water Stills: 5 and 25 GPH.
2—Lard Rolls: 4x9' single, 2x5' double.
1—Prater No. 20 Hammer Mill.
2—(New) Triangle Carton Filling Lines.
3—Portable Elevators, 500 and 1000 lb.
4—3x3x7' horizontal Retorts.
1—3' Copper Vacuum Pan.
2—No. 600 DeLaval Clarifiers.
2—(New) 24x18" Vibrating Screens.
2—Casers, Knapp Model E, 300x407 cans.
1—American Utensil Juice Extractor, Model B.

Send us your inquiries, also your list of surplus equipment, which we purchase for cash.

LOEB EQUIPMENT SUPPLY CO.
908 N. Marshfield Ave., Chicago 22, Ill.

1—World Rotary Labeler, fully automatic.
1—New Uni-Table, 12" belt, 10' long, 12" side leaves, complete with variable speed drive.
1—Haller-Horix 18 spout, 14 oz. Autom. Catsup Filler.
1—Reed Vertical Mayonnaise Mixer, 80 qt. cap.
3—Ermold Semi-Automatic Labelers.
4—Copper Jacketed Kettles, 10 and 30 gal. cap., with stands.
1—Pfaudler Blue Glass Lined Mixing Tank, 300 gal. cap., Jacketed and Insulated.
1—Miller-Hydro Dble Line Sonker, 120 cases per hour.
1—Reed Vertical Mayonnaise Mixer, 80 qt. cap.
1—Toldhurst 32" Centrifugal, copper basket, belt dr.
1—Gould C. I. Cent. Pump, 10" x 8", Bronze Fitted, 2000 GPM, 130' Hd.
Also, large inventory of Simplex & Duplex Steam Pumps.
New Stainless Steel Storage, Mixing & Bottling Tanks.
New Wood Tanks, all sizes.
New 12" wide, 10' long sections, Skate & Solid Roller Portable Gravity Conveyor.

GIRARD MACHINERY & EQUIPMENT CO.
949 N. 9th St. — Lom. 6744 — Phila. 23, Pa.

COMPLETE LIQUIDATION FOOD and PROCESS EQUIPMENT

LAST FEW WEEKS

Our gigantic building and several hundred others in our vicinity have been confiscated by the New York Housing Authority for a low cost model building project.

We are forced to move hundreds of tons of equipment, plus our shops, offices, etc. In order to save the almost prohibitive costs of such a moving operation, we are now planning a full scale LIQUIDATION.

However, if you can use any of the units now in stock, we are prepared to cut prices drastically to ship them to you instead of to our new location of which we will advise you later in this publication. Act now and save.

AGITATORS
BLOWERS
COLLOID MILLS
CAPPERS
DRYERS
FILLERS
FILTER PRESSES
KETTLES
LABELERS
MILLS—GRINDERS
MIXERS
PACKAGING UNITS
PUMPS
SIFTERS—SCREENS
STILLS
VACUUM PUMPS

Send for Complete Stock List or Wire Us Your Inquiry Collect

FMC FIRST MACHINERY CORP.
EAST 9th STREET & EAST RIVER DRIVE, NEW YORK

EAST RIVER DRIVE EAST 9th ST. N. Y.

IMMEDIATE DELIVERY

NEW TANKS

STAINLESS STEEL ● COPPER
ALUMINUM ● 100 TO 10,000 GAL.

★

NEW TUBING

STAINLESS STEEL ● COPPER
CUPRO NICKEL ● BRASS
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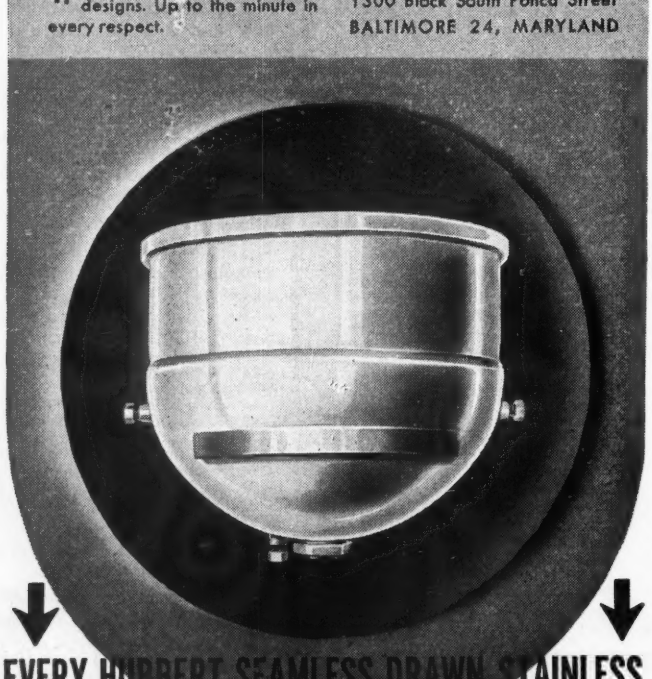

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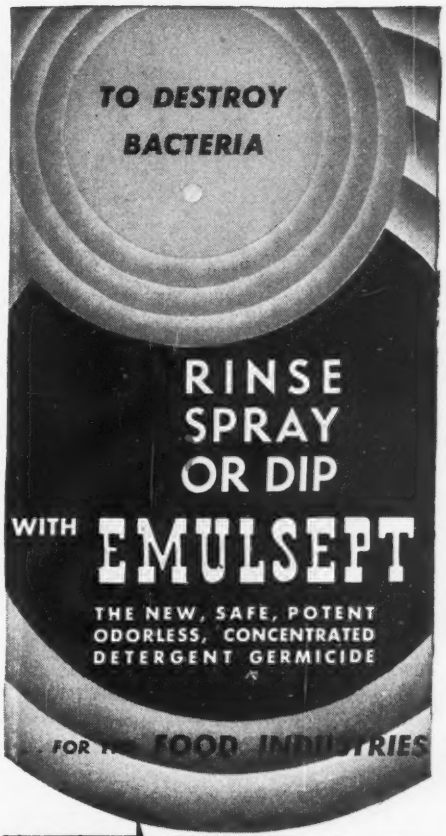

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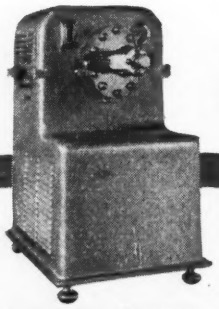

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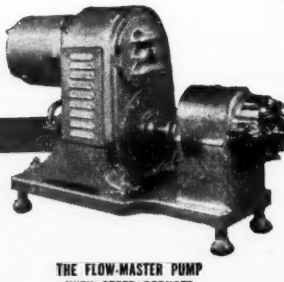

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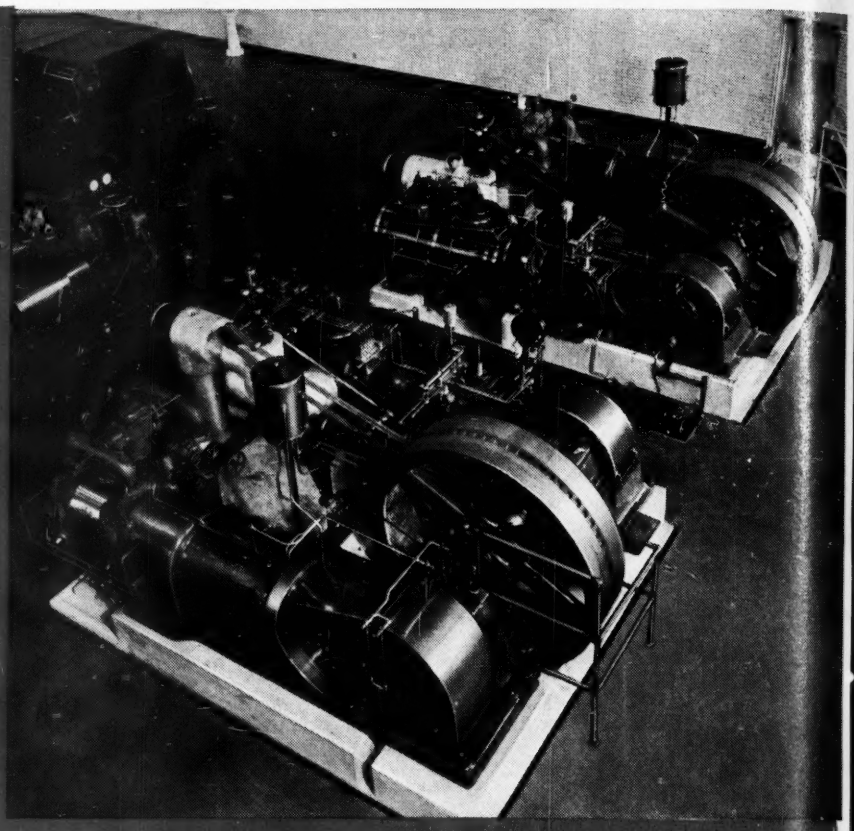

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